Railway Age

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An Unusual Signaling Program

THE installation of automatic block signals on the Northern Pacific is noteworthy not only because of its extent but also, and of more significance, by reason of the improvement of train operation and the increased track capacity effected thereby. Starting in 1910 this road has equipped 2,225 miles of line with signals in 14 years. The first extensive installation, which was made on 100 miles of single track between Laurel, Mont., and Livingston in 1910, convinced the officers that automatic signals would increase track capacity and reduce the number of train accidents. A definite signaling program resulted. All of this 2,225 miles of signaling has been installed under the jurisdiction of one man, C. A. Christofferson, who has been signal engineer since February 24, 1909. In an article elsewhere in this issue Mr. Christofferson describes the time saved in train operation on the earlier installations and indicates why the different divisons were selected in order in the progressive program. During the last 14 years he has collected much data regarding the beneficial results of these automatic signals from dispatchers, operating officers and others. He has also compiled records for a period of years showing the cost of operation and maintenance of this extensive installation. Among the secondary advantages which he has enumerated, broken rail protection is one of the greatest, as high as 581 broken rails having been detected by signals in one year. Records of open switches and cars fouling the main track are also shown. In other words, this article is a record of what signals have done for years on a large road. Any railroad officer seeking information regarding what signals may do on his road will find a wealth of information in the experiences of the Northern Pacific.

Crow's Nest Agreement Upheld

THE Supreme Court of Canada has validated the Crow's Nest Pass Agreement, fixing low maximum rates on the Canadian Pacific in the Prairie provinces and thereby nullifying the action of the Canadian Board of Railway Commissioners. The Board had ruled that it was not bound by this agreement in fixing rates, taking the stand that to consider such a pact would be inconsistent with its duty to make rates which will provide reasonable returns to the railways and at the same time not discriminate between communities. The Crow's Nest Agreement fixes rates which are so low that to apply them elsewhere than in the territories specifically included in the agreement would be ruinous to the railways. The Court, indeed, holds that they should not be applied elsewhere. The decision, therefore, means nothing more than sanction for the grossest kind of rate discrimination. No fault, of course, can be found with the Supreme Court, which has only made known what the law is. It is powerless to do otherwise than define the law; Parliament alone can make or alter the law. Indeed the court's decision clarifies the issue somewhat, since a decision against the agreement might have enabled Parliament to sidestep the question. This is impossible now. The whole freight rate question will have to be discussed and a decision will have to be reached. That such discrimination can be sanctioned is almost unthinkable. Still more so is it that the discrimination can be corrected by reducing all rates to the ruinous Crow's Nest level. Yet nothing is impossible in politics, and the districts benefiting by these rates will fight to retain them. The present session of Parliament promises to be interesting.

It Can't Be Done

RAILWAY men are no different from men of similar talents in other industries in their normal habits of thinking. One trait which is common to many outside, as well as inside railway circles, is the inclination to magnify the difficulties of a new problem unduly with the result that many undertakings which might be highly productive are abandoned after only perfunctory consideration. An illustration of this occurred recently on a large road. It was desired to ascertain the number of employees who possessed a certain type of training. When the officer in charge of these records was approached he agreed immediately that the desired information would be of great value, but stated that its compilation was out of the question as it would require a force of 50 clerks for 60 days. After further discussion and consideration he reduced this estimate to 20 clerks but maintained that this would be the minimum. He was persuaded to make a test with the records of a limited number of employees, and after noting the result of this test he ventured to undertake the entire project. Its completion required 208 clerk hours. This illustration is cited not because it is unusual, but rather because it illustrates a condition which is found all too commonly in railway service. Any problem which is worth any consideration is worth sufficient consideration to produce accurate figures. The railways have lost much from incorrect conlusions based upon inaccurate and hastily compiled information.

How Fuel Efficiency Saves Money

THE value of improved locomotives and the benefits derived from having locomotives in good condition are rather strikingly illustrated by statistics showing the saving made by the railways in 1924 by increased efficiency in the use of locomotive fuel. The average number of pounds of coal consumed per 1,000 gross ton-miles of road freight service in 1923 was 161 pounds and in 1924 only 149 pounds, a reduction of 12 pounds, and the best year's record ever made. Total gross ton-miles in 1924 were 1,085,765 millions. The amount of coal saved in road service by increased efficiency in its use was, therefore, 6,514,590 tons. The average cost in 1924 was

$3.05 per ton and therefore the saving was about $19,870,000. The amount of coal consumed in passenger service was reduced from 18.1 to 17 pounds, per passenger train car-mile or 1.1 pounds. This made a further saving of almost 2,000,000 tons or about $6,100,000. The foregoing figures are for road service only. There must be added for other service a saving by the Class I roads of approximately two and one-half million dollars. It would appear, therefore, that the saving accomplished by the Class I roads solely by increased efficiency in the use of coal was about $29,500,000. The reduction in the amount of coal used by the Class I roads in 1923 as compared with 1920 was about 5,169,000 tons although the freight service rendered in 1923 was slightly larger and although, in spite of a reduction of passenger traffic, there was no reduction in the passenger service rendered. If the saving in 1923 as compared with 1920 be added to that made in 1924 the total saving in 1924 as compared with 1920 is found to amount to about 14,400,000 tons of coal, or at the average price paid in 1924 to more than 44 million dollars. This saving would pay a 5¾ per cent return upon an investment of about 770 million dollars—a figure showing that although the average cost of railway coal declined from $4.20 a ton in 1920 to a little more than $3 a ton in 1924, the railways can afford to continue to make large investments in improved locomotives and other facilities which will help save fuel.

Does It Pay?

THE maintenance of obsolete machine tools invariably proves to be false economy. Machines bought 20 or 25 years ago were not built to withstand the cuts which modern high speed tool steels have made possible. As a result, they are now obsolete and no spare parts are obtainable from the manufacturers. Consequently, when a machine needs new parts, it is necessary to have them made in the shop where the machine is located or have them specially made by the manufacturer. The cost of such parts has been known to approach very closely to the price paid for the machines when they were purchased. Does it pay to keep such machines in service at such a price? The costs of unit production on obsolete machines are much higher than they are on modern tools capable of utilizing fully the metal removing capacity of modern high-speed steels. Why, then, do they still remain in service? In many cases is it not because the executive, who is a layman in such matters, does not know concretely what are the real possibilities from their replacement? Every mechanical officer knows from his own observation that some of these old tools ought to be replaced. Others, no doubt, may justifiably be retained where their use is only occasionally required. But for his own information as well as for the purpose of convincing the layman, would it not be worth while to put every tool 20 years old or older on trial, with the burden of proof on the defense? A list of these old tools should be compiled. The cost of production of all the jobs done on each tool should be carefully analyzed, taking into account capital charges and the item of necessary idleness, if tools are required which cannot be kept busy at all times. This analysis would quickly bring out the fact that considerable money could be saved by replacing these old machines with new ones which would effect such a consistent saving that in many cases they would pay for themselves in a year's time. It would quickly bring to light extravagant wastes in tool maintenance costs. The evidence would be so concrete that the executive who ignored it would himself be placed on the defensive.

Cabooses as Sleeping Quarters

THERE are safer and more comfortable places to sleep than a caboose; yet a great many railroad employees absent from their homes on duty have no other place to go for rest. Either other facilities are entirely lacking or are unattractive or too expensive. It is gratifying, therefore, to see the utilization of the caboose for sleeping quarters gradually being supplanted by convenient, clean and inexpensive accommodations elsewhere, provided largely through the initiative of the railroads. Still, there remain many locations where such more desirable accommodations are not available, and the men must continue to sleep in cabooses. In such cases is it not just that the railroads should be expected to make such use as safe and comfortable as possible? Cabooses on caboose tracks are far too frequently roughly handled by switching crews, making sleep practically impossible for the occupants, and indeed in some cases actually menacing their safety. Is there any good reason why cabooses occupied as sleeping quarters should not be handled as carefully as sleeping cars with passengers aboard? Certainly, "kicking" them about like cars of coal should not be tolerated.

The London Congress—A Mere Joy Ride?

LAST week we had something to say in these columns of the benefits which active support of the International Railway Congress might bring to railroad men of this continent. Let us face the matter frankly and admit that in the past there has been on the part of many the attitude that attendance at an International Congress should be regarded more in the light of a pleasure trip than as a business proposition.

Well—perhaps this has actually been the case in the past, but, even if it has, is there any reason why it must remain so? We think that most people will grant that railroad men from foreign countries can learn something from American practice. Indeed scores of them come to these shores each year for this purpose. Does it not follow that American railroad men might learn something by greater familiarity with practices in foreign countries—particularly with reference to the handling of dense passenger traffic, the rapid transportation of merchandise and collection and delivery of freight?

If the previous International Railway Congresses have not been as fruitful as they might be for American participants, is it not possible that they have not been approached with the right attitude of mind, i.e., with the desire to follow proceedings closely for useful suggestions and the further determination to make contacts with officers of foreign railways for the purpose of a subsequent interchange of ideas and questions by correspondence?

If any railway executive is debating in his mind whether sending a certain member of his staff to the Congress in London this summer would be profitable or not, could he not settle the question in the affirmative by assigning him not only to attend the Congress but to bring back a report on some phase of British or European practice as well? Such a subject might be, for instance, mechanical "car-riders" in Germany, store-door delivery and l.c.l. service in England, audible cab-signals in France, suburban transportation in London and Paris, the development of turbine and Diesel locomotives, electrification in France and Switzerland, employee housing in England and France.

comparison of service of government and private railways, labor problems and how they are being solved, public relations and advertising. These are only a few of many subjects which might be suggested. One or more could be found for any officer in any department of railroad work, the study of which on his trip to Europe would be of help to him in the performance of his duties here, quite aside from the profit he would gain by following closely the sessions of the International Railway Congress in his particular field.

The benefit which anyone derives from any convention depends largely on the amount of interest he takes in it. It is perfectly possible to attend the best-planned conventions and still to waste one's time. This is true with respect to the International Railway Congress as well as any other. But if there is a serious objection to encouraging attendance at conventions because of this situation, it can easily be guarded against by making sure that each delegate knows why he was chosen by the management and what he is expected to observe and report upon when he returns.

Results of the Shop Strike to Date

THE expenditures of the Class I roads for maintenance of equipment in 1924 were $1,270,000,000, a reduction, as compared with 1923, of almost $205,000,000. These expenditures were only slightly larger than in 1922. They were greatly increased in 1923 by the effects of the shop employees strike. The reduction made in 1924 is the best evidence that the effects of the strike have virtually been overcome.

There still remains to be determined one very important question which the strike raised. Some of the roads settled with the national shop crafts unions. A larger number did not do so and on these railways the national shop crafts unions have at present no existence. There has been much discussion of the question whether the roads that settled or the roads that did not settle have secured better results from the policy adopted by them.

On some roads which settled with the unions, notably the Baltimore and Ohio, the unions have adopted methods of co-operating with the managements to increase shop efficiency. The leaders of the shop crafts unions have claimed that the methods adopted and results secured on these roads show that the railways have more to gain by dealing and co-operating with the national unions than with so-called "company unions" composed solely of the employees of each road and dealing with each management through representatives chosen by themselves. They have attempted to show that the roads that have never settled with the unions have suffered and are still suffering heavy losses by their policy.

On the other hand, officers of the railways that did not settle with the unions have claimed that their relations with their employees have been more harmonious and that they have been securing greater efficiency in the operation of their shops than would have been the case if they had settled.

The *Railway Age* has never participated in these discussions. So far as we have been able to get it we have published information regarding the methods adopted on both groups of roads. We have believed that whether a railway dealt with the national unions or not it was essential to securing the best results for both railways and employees that there should be a good understanding and close co-operation between them. We have from time to time published statistics regarding the condition of equipment and the maintenance of equipment expenditures on the two groups of roads and have pointed out that for at least some months after the settlements the roads that settled were apparently getting better results than those that did not settle. We have also pointed out, however, that this was natural. The roads that settled immediately recovered their experienced employees and were able to re-establish their old organizations. On the other hand, the roads that did not settle had to build new organizations and to train many thousands of new employees. We have pointed out that because of these facts it would be necessary to await the results secured after the passage of a period of months or even years before reasonable conclusions could be drawn as to whether the policy adopted by the one group of roads or the other was productive of the greater efficiency in shop operation.

The total expenditures of the railways for maintenance of equipment are now approximately the same as they were immediately before the shop strike began. The wages being paid are lower, principally because of the wage decision of the Labor Board which resulted in the strike. On the other hand, the railways are handling more business and this makes necessary the employment of a somewhat larger number of men. Maintenance of equipment expenditures of all the Class I roads in June, 1922, just before the strike began, amounted to $102,330,000. In November, 1924, a month having the same number of days, they were almost $103,000,000. Therefore the condition of the equipment and the maintenance of equipment expenditures of the two groups of roads in June, 1922, and November, 1924, afford a fair basis for comparison.

Table I—Twelve Roads That Settled Strike

Number of cars on line December 1, 1924	613,037
Number of cars in bad order December 1, 1924	43,749
Percentage of cars in bad order December 1, 1924	7.1
Number of locomotives December 1, 1924	16,734
Number of locomotives in bad order December 1, 1924	3,054
Percentage of locomotives in bad order December 1, 1924	18.2
Maintenance of equipment expenditures, June, 1922	$26,704,292
Maintenance of equipment expenditures, November, 1924	$26,655,700

Twenty-nine Roads That Did Not Settle Strike

Number of cars on line December 1, 1924	1,276,848
Number of cars in bad order December 1, 1924	105,408
Percentage of cars in bad order, December 1, 1924	8.2
Number of locomotives December 1, 1924	37,185
Number of locomotives in bad order December 1, 1924	6,880
Percentage of locomotives in bad order December 1, 1924	18.5
Maintenance of equipment expenditures, June, 1922	$56,159,388
Maintenance of equipment expenditures, November, 1924	$56,027,078

The statistics in the table show that there was very little difference on December 1 in the condition of equipment on the two groups of roads. They also show that on both of them maintenance of equipment expenses in November, 1924, were slightly less than in June, 1922, the difference in each case, however, being only a fraction of 1 per cent.

The figures demonstrate that the roads that did not settle the strike have overcome any temporary handicaps they gave themselves by adopting this policy and are now operating their shops and maintaining their equipment as economically, in comparison with the roads that did settle, as before the strike began. Of the roads that did not settle there were 18 whose maintenance of equipment expenses were larger and eleven whose expenditures were smaller in November, 1924, than in June, 1922. Of the roads that did settle there were seven whose expenditures were larger and five whose expenditures were smaller than in June, 1922. A study of the figures road by road indicates that the differences were mainly due to larger increases in some cases than in others in the amount of traffic handled.

Comparisons between individual roads are likely to be invidious. Such comparisons are, however, constantly

being made by labor leaders. For example, "Labor," the weekly organ of the railway labor unions, in its issue for February 7 published an editorial comparing operating and financial results on the New York Central and the Baltimore and Ohio, which settled the strike, and on the Pennsylvania, which did not settle it, and claiming that the Pennsylvania's "war on labor organizations" is responsible for the difference between the operating ratios of these roads. If the Pennsylvania's "war on labor organizations" was doing as much harm as claimed statistics regarding the condition of its equipment and its maintenance of equipment expenditures should afford especially good evidence of this fact, since the labor organizations have moved heaven and earth to prevent the Pennsylvania from establishing efficiency in itse shops. Everybody in the railroad business knows that the Pennsylvania has been the especial object of their attacks.

On December 1 the New York Central had 4.2 per cent of its freight cars and 22.3 per cent of its locomotives in bad order. Its maintenance of equipment expenses in June, 1922, were $7,554,076 and in November, 1924, $6,718,751. On the same date 12 per cent of the Baltimore and Ohio's freight cars and 25.6 per cent of its locomotives were in bad order. Its maintenance of equipment expenses in June, 1922, were $4,340,037 and in November, 1924, $4,345,382. On December 1, 1924, 10.9 per cent of the Pennsylvania's freight cars and 30.1 of its locomotives were in bad order. Its maintenance of equipment expenditures in June, 1922, were $12,831,623 and in November, 1924, $13,006,066. These figures do not make such a bad showing for the Pennsylvania considering the attacks that have been made on it.

But why confine the comparison to the Pennsylvania? There are other roads which did not settle the strike. One of these is the Atchison, Topeka & Santa Fe. On December 1 6.7 per cent of its freight cars and 17.8 per cent of its locomotives were in bad order. Its maintenance of equipment expenditures in June, 1922, were $3,420,274 and in November, 1924, $3,059,424. The Illinois Central, which did not settle, on the same date had 3.5 per cent of its freight cars and 11.4 per cent of its locomotives in bad order. Its maintenance of equipment expenditures in June, 1922, were $3,007,704 and in November, 1924, $2,925,207.

This editorial is not intended as either a defense or criticism of the policy of either the roads that did not settle the strike or those that did. The *Railway Age* took the position in the first editorial it published after some of the roads settled that it would be a good thing to have some of the roads deal with the unions and others not deal with them because it would give opportunity to compare the results gained under two widely different policies. Results are the only things that count, and the facts as reported by the various railways show that no conclusion which actually is based upon facts can yet be drawn as to which policy is producing the better results.

Books and Articles of Special Interest to Railroaders

(Compiled by Elizabeth Cullen, Reference Librarian, Bureau of Railway Economics, Washington, D. C.)

Books and Pamphlets

Consolidation of Railroads. A List of References containing material published 1923-1925, and supplementing the list dated August, 1923. 44 mimeo. p. Issued by Library, Bureau of Railway Economics, Washington.

Co-operation in Foreign Countries, by U. S. Federal Trade Com. Report on co-operative banks, credit associations, etc., their organization, laws affecting them. 202 p. Pub. by Govt. Print. Off., Washington, D. C. 25 cents.

Long and Short Haul Charges. Hearings before Committee on Interstate and Foreign Commerce, U. S. House of Representatives on S. 2327. 762 p. Pub. by Govt. Print. Off., Washington, D. C.

Seventy Years of Life and Labor, by Samuel Gompers. His autobiography. For sections commenting on railroads, see Index, p. 612. 2 vols. Pub. by E. P. Dutton, New York. $10.00.

Periodical Articles

Educational Problems of the Railways, by Roy V. Wright. Special Libraries, Feb., 1925, p. 41-53.

No Consolidation by Compulsion, by Mark W. Potter. Nation's Business, March, 1925, p. 13-15.

Roads—Motor and Rail, by George W. Anderson. Atlantic Monthly, March, 1925, p. 393-403.

Some Economic Aspects of Transportation, by Dr. J. H. Parmelee. Especially the problem of co-ordination of transport agencies. Special Libraries, Feb., 1925, p. 39-41.

Source Material on Railroad History, by Elizabeth Cullen. Special Libraries, Feb., 1925, p. 44-48.

What Private Railroad Management Has Accomplished, by Lewis H. Haney. Review of railroad performance since 1920. Magazine of Wall Street, Feb. 28, 1925, p. 736-737, 783-785.

Railway Administration at Home and Abroad, by Sir William Acworth. His presidential address, reviewing post-war developments in eight nations, before Railway Students Association of London School of Economics. Modern Transport, January 31, 1925, p. 7.

New Books

Railways of the World, by F. A. Talbot. 2 Volumes, each of 360 pages. 8 in. by 11 in. Profusely illustrated. Bound in cloth. Published by Cassell & Company, Ltd., London. United States Sales Agents, the Simmons-Boardman Publishing Company, 30 Church Street, New York. Price, both volumes, $10.

This work is intended for the general reader. This does not mean that it is of no value to the man in active railroad service; quite the contrary. But, from his point of view, it is to be read for the purpose of securing information about the industry in a general way the world over rather than as an exhaustive technical or reference work.

The work, then, is frankly popular and non-technical, but it is nevertheless accurate and far from superficial. The subjects described were apparently selected largely for their popular appeal; yet many of them are doubtless unknown to the average railroad man on this continent and could not fail to interest him. Furthermore every subject treated is richly illustrated by reproductions from photographs—which adds greatly to the interest and effectiveness of the reading matter. To give a general idea of the scope of the work some chapter headings, selected at random, are given:

Where the Snow Plow Works in Summer (in the northern part of the Scandinavian peninsula).
The Railway Invasion of India.

The Crookedest Railway in the World.
The Locomotive Booster as Applied in America and England.
Electric Locomotives—Development and Classification.
Fighting the Sand Seas of the Columbia River.
Famous Expresses (of North America, Great Britain, Europe, South Africa and Australia).
Driving and Doubling the World's Largest Tunnel (the electrified Simplon in Switzerland, 12.3 miles long).
Moving 35,000 Tons of Coal a Day (on the Norfolk & Western).
Firing the Locomotive Mechanically.
The "Mono"-Railway (including the unique "Lartigue" line in Ireland, recently abandoned).
How the Railway Created the Dominion of Canada.
The Railway Web of the Malay States.
Crossing the Andes by Rail.
Rack-Rail Lines.
From Trail to Rail (tracing the transition from stage-coach to railway in the early days in the United States).
Triumph of the Tube Railway (and other subway lines).
Railway Building in the Mountains of Switzerland.
Evolution of the Sleeping Car.
The Battle of the Gages in Various Countries.
Across Australia by Rail.

These are only a few of the subjects covered. The development of the locomotive is dealt with intensively in many chapters, both from an historical and a mechanical standpoint, outstanding types being illustrated and described. Almost all the important pioneer locomotives are included and there are separate chapters on the Ten-Wheeler, the Consolidation, the Decapod, the Mountain, the Mallet and some other types.

The books are richly printed and bound and the illustrations are reproduced with remarkable clearness. It is a work which should find a welcome in the library of any railroad man whose interest in his industry and its achievement extends beyond the duties of the position he holds and the particular railroad which he serves. And it will be of interest not only to him, but to his family as well.

Theorie Und Berechnung Der Eisernen Brucken. (Theory and Calculation of Iron Bridges), by Dr. Frederick Bleich, 581 pages, 8 in. by 11 in. Bound in cloth. Published by Julius Springer, Berlin, Germany. Price $9.00.

Although this book is available only in the German, it has a place in the library of the American bridge engineer because of its value as a reference work. The fact that German standards of design, fabricating practices and erecting methods differ from ours does not militate against the usefulness of this text to the American bridge engineer, because it is not intended for use as a drafting room manual and does not deal with the practical solution of problems in terms of actual dimensions, standards, clearances, etc. Instead, it comprises a critical study of the mechanics of steel bridges, not only with respect to loads, stresses, proportion of parts and the analysis of frame structures, but also as to the functioning of joints, splices, etc.

Within the scope of the work it evidences unusual thoroughness on the part of the author. As an illustration, such matters as the distribution of bearing stresses on rivets, the effect of torsion on the flexture of long beams, the distortion of web plates and the distribution of stresses in gusset plates, are covered in more minute detail than in most American texts. Chapters on the fatigue of metals, secondary stresses and impact present the subject matter in a comprehensive manner, the chapter on the last named, for example, devoting considerable space to the vibration periods of spans of various lengths. The book is to be commended for the excellence of the typography, particularly in the presentation of mathematical derivations.

The illustrations are excellent and generous use has been made of sketches and diagrams.

Letters to the Editor

[*The* RAILWAY AGE *welcomes letters from its readers and especially those containing constructive suggestions for improvements in the railway field. Short letters—about* 250 *words—are particularly appreciated. The editors do not hold themselves responsible for facts or opinions expressed.*]

St. Paul's Electrification Economies

NEW YORK.

TO THE EDITOR:

Have read with much interest the article on "St. Paul's Electrification Shows Economies Over Steam," in your February 28, 1925, issue.

It is stated that with steam locomotives a 2,000-ton train was hauled up one per cent grades. Evidently these were very inadequate, and probably obsolete, saturated steam locomotives, as I recently rode a Mallet superheated locomotive over the Ozark Mountain division of the Kansas City Southern which moved 2,850 actual gross tons in a freight train of 60 cars, over a ruling grade line of 1.6 per cent.

My opinion is also confirmed by the statement that 133 freight steam locomotives would have been necessary to perform the work done by 42 freight electric locomotives, in 1923, over the electrified section.

I believe that your readers would be enlightened by a more detailed description of each class of the 59 electric, and 163 steam locomotives used in the preparation of the comparative figures. Also in the details of the fixed charges applicable to each, the electric and steam operations.

If the St. Paul steam performance is the best that can be produced, I do not see how, with hydro-electric power available, the Northern Pacific and Great Northern can afford not to electrify their competitive lines.

JOHN E. MUHLFELD,
Consulting Engineer.

The C. M. & St. P. Electrification Report

NEW YORK.

TO THE EDITOR:

The study of comparative costs of steam and electric operation on the Chicago, Milwaukee & St. Paul in the February 28 issue of the *Railway Age,* is of great value to all students of the subject. The management of this railroad is to be thanked for making it public, and the *Age* for its comprehensive presentation. It is probable, however, that few railroad men can give to any such analysis more than a casual reading without finding details in which there appears to be a bias in favor of one method of operation or the other.

In any such comparison between two systems of operation, one pre-existing and the other substituted, or proposed to be substituted, two methods of comparison offer themselves: (1) comparison between the existing system (steam) with the existing equipment of old apparatus, purchased at the lower prices of former years, and the

new system (electric) with a complete outfit of new equipment; and (2) comparison between the existing system, assumed to be supplied with a complete outfit of new and up-to-date equipment (with all that that implies of increased efficiency and conveniences) and the new system similarly equipped. The second method of comparison is generally of purely academic interest, for there is seldom a possibility of substituting on a road or division a complete new outfit of steam locomotives and new and newly located shops, engine houses, and auxiliary facilities.

The St. Paul estimate seems to be a mixture of the two methods of comparison. The steam operation is charged with the pre-existing locomotives, not at actual cost or at depreciated book value, but at the prices of 1918.

Presumably steam locomotives purchased in 1918 would have been more perfectly adapted to the road and traffic, and more efficient and economical than the pre-existing locomotives. Yet the steam operating costs are computed not at the reduced rates which might be assumed to exist with the assumed outfit of new steam locomotives but at the rates due to the old, less efficient equipment. The same line of reasoning applies, to a less degree, to certain other items.

Again, it is open to question whether in such a comparison the steam operation should, in such items as engine houses, coaling and water stations, cinder pits, etc., be burdened with more than the salvage value of these facilities after abandonment. If the estimate is to reflect truly the effect on the treasury, the difference between the steam and electric interest items should equal the increase in annual interest payment, and to secure this result the interest for steam operation should be computed on such a sum, only, as the treasury would receive as the result of the abandonment of the facilities. If a $50,000 water plant, for instance, has to be abandoned, when the division is electrified, with a salvage of only $10,000, the treasury is relieved to the extent of only $10,000, not $50,000. If a particular $50,000 of bonds could be allocated to that water station, obviously $10,000 of the bonds could be redeemed from the proceeds of the salvage but the interest on the remaining $40,000 would continue. This criticism has little application to locomotives, because of their ready transfer to other divisions, but may apply to certain other items, possbly to the d. c. signal system, which had to be replaced by a. c.

In most electrification comparisons the saving due to the discontinuance of the line haul of locomotive fuel is a large item. In the present comparison, arranged according to I. C. C. accounts, this item, of course, does not directly appear. While data as to source and routing of fuel are lacking, it seems probable that the saving on haul of the $1,200,000 worth of coal in table II might amount to some hundreds of thousands of dollars per annum. No such large reduction in transportation costs (other than those naturally to be expected due to reduction in number of locomotives and other effects of electrification) appears in the table. An analysis of this item would be of great value for future electrification estimates. It seems fair also to assume that some of the locomotive fuel used on the divisions represented in Tables II and III was hauled on other divisions; if so, there appears to be no allowance made for the cost of such haul.

Probably most steam men would examine with much interest the details of the argument whereby four electric yard locomotives supersede ten steam locomotives, if equally efficient and intensive operation be assumed.

Inspection of the tables does not reveal the answer to a question which is of some interest—whether the substitution of regeneration for air braking as the main reliance in taking trains down long grades does in practice bring about an important saving due to the abolition or reduction of special precautionary inspection and maintenance work on brakes preparatory to such descent.

It would be interesting to know whether the rate 6 per cent at the head of the Depreciation column of Tables IV and V is the rate of depreciation, or the rate of sinking fund earnings, and, if the latter, what rates of depreciation were used on the various classes of equipment.

ENGINEER.

A Voice From the Ranks

EVANSVILLE, Ind.

TO THE EDITOR:

I have read the editorial "Waiting on Coppers" in the December 27 issue of the *Railway Age* and am reminded that for the past six months at our terminal we have been out of many small items in the material line a good part of the time. Such items as small bolts, cotter keys of all lengths, and split-keys may be mentioned. Sometimes copper ferrules are out of stock and either cause a delay or we must use coppers which are not of the right size for a good job. As I see the matter, it would pay big to keep an over supply of small items on hand rather than be out. On locomotive front end work alone my helper and I have to hunt up scrap bolts, nuts and washers and sometimes make split-keys which we cannot get from the storeroom. We lose from one to two hours on the job hunting up material and about the same time working with inferior material. This lost time is very valuable especially if an engine is needed for a quick turn-around.

Men become disgusted when they have nothing to work with, and do not try as hard as they should to get a job out.

I can look back over the past and truthfully say that I have been honest in my work, gone out of my way to help out in tight places and have a clear conscience as far as giving the company I work for a square deal. But sometimes when my foreman says this engine must go out on No. 10, and there are no bolts, washers, or nuts for a front end, I get along slow and have to accomplish almost the impossible. My foreman is at home after a trying day depending on me to get the job out. I keep plugging along as best I can but wonder why the company is skimping and saving on a few small items, making a nervous wreck out of its employees and foremen trying to do something with nothing. There is a big risk in not getting the job out and the labor cost is at least one-third more on account of a shortage of material. I wonder and wonder, and sometimes think what's the use; but can't quit.

Then you sometimes work with or after one of those men who think the company is a meal ticket. He doesn't care a hang what comes or goes, just so the whistle blows and pay day comes around. I feel that we could eliminate some of these evils in the shortage of material and at the same time educate the men with instructions on different kinds of work. Have the foreman suggest to each individual man a good mechanical book to go with his line of work and insist on his taking a good mechanical magazine. Let each man learn the particular thing he wants to learn but at the same time see that he does his share of the work. Take an interest in each man; make him feel so at home that he will want to stay with the company and learn more and more and be a better man and a better mechanic. This man will be a big asset to his company. There is lots of room for improvement.

ENGINEHOUSE BOILER MAKER.

Severe Winter Weather a Serious Consideration in Signal Maintenance on the N. P.

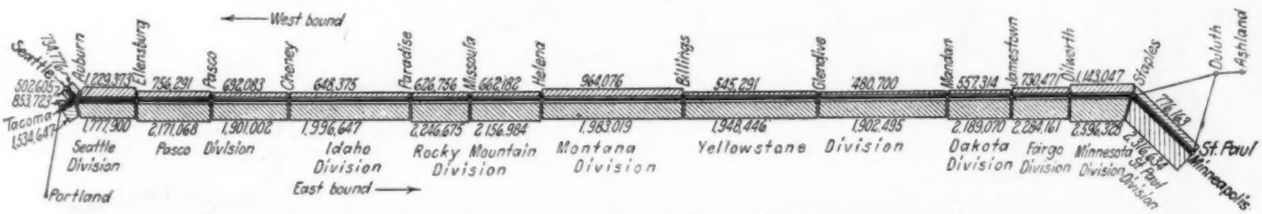
Northern Pacific Main Lines 76 Per Cent Signaled

Fourteen-year program completes 2,225-mile installation, an important factor in economical train operation

By C. A. Christofferson
Signal Engineer, Northern Pacific, St. Paul, Minn.

THE Northern Pacific recently completed and put into service 30 miles of automatic block signals on the main line extending from Little Falls, Minn., to Staples. The outstanding feature of this installation is the fact that it forms the last unit of a continuous stretch of automatic block signals extending from St. Paul and Duluth, Minn., to the Pacific Coast, and the division where the need was greatest. This program was continued to the present time, except during the war when practically all construction work was abandoned.

The present mileage operated by the Northern Pacific, main line and branches, is 6,422 miles of road, of which 2,225 miles, or 35 per cent, is equipped with automatic signals. Eliminating the branch lines and considering



Traffic Density Diagram of Main Line Traffic on Northern Pacific for 10 Months Ending October 31, 1923

that it puts the Northern Pacific well up toward the top of the list of railways having a high percentage of their main lines equipped with a modern automatic block signal system.

The present signal department of the Northern Pacific was organized in 1909. Prior to that time only a few short stretches of automatic signals had been installed, but shortly thereafter, comprehensive studies of traffic conditions on the several divisions were made and, as it was estimated that a considerable saving could be effected by the installation of automatic block signals, a definite signaling program was determined and adopted. This project specified that a certain mileage of automatic block signals should be installed each year, beginning on only the main-line mileage, 2,956 miles of road, 76 per cent of the Northern Pacific main lines is equipped with automatic signals. The total number of automatic signals on the Northern Pacific is 3,900. In length of road signaled, the Northern Pacific is second only to the Southern Pacific (Pacific System) which has 2,428 miles of road equipped with automatic signals.

The first division considered under this program was the single-track line from Laurel, Mont., to Livingston, where traffic was heavy on account of the considerable business delivered to the Northern Pacific at Billings by the Burlington. With the manual block system then in effect and the practice of directing train movements by "31" orders, and also on account of the numerous curves

on part of the line, which restricted the engineman's range of vision, it was practically impossible to get trains over the road under the 16-hour limit imposed by Federal law.

The manual block system was inadequate because it imposed a space interval from station to station, often as much as eight or ten miles, whereas traffic required a block interval of approximately a mile, during periods of heavy business. The safety of the manual block system depended entirely upon the strict observance of rules, orders and time tables on the part of dispatchers, operators, trainmen and other employees; there was no check against failure of the human element.

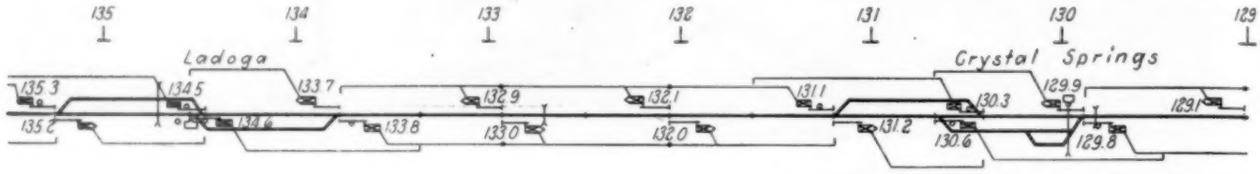
The telegraph block or time-interval system then in service on some of the divisions was inherently inadequate, as has long since been determined, first, because it had all the defects of manual block, mentioned in the preceding paragraph, and, in addition, it intended to impose a time interval, which might easily be ineffective, whereas the only logical consistent method of blocking is a space interval.

Although no very serious accidents are recorded, there were numerous minor ones. Even within the last four years eastbound and westbound sections of the North Coast Limited met head-on, due to an engineman overlooking a train-order. No serious injuries resulted but every officer concerned feels relieved now that the division on which this occurred is equipped with automatic signals.

One solution of the problem was the double tracking of parts of the line, and there was considerable agitation in favor of this, the chief argument against it being the heavy cost. After investigating the problem from all standpoints, it was finally decided that automatic signals could be installed for a small part of what it would cost to construct a second track, and that they would provide ample capacity, materially increase safety, and make possible the adoption of more efficient methods and practices. It is significant that during the past ten years since the effects of signaling have been apparent only 100 miles of the line has been double tracked, or an average of 10 miles a year. During the 15 years that have elapsed since the first extensive signal installation was completed, it has been conclusively demonstrated that the automatic signals have been a paying investment.

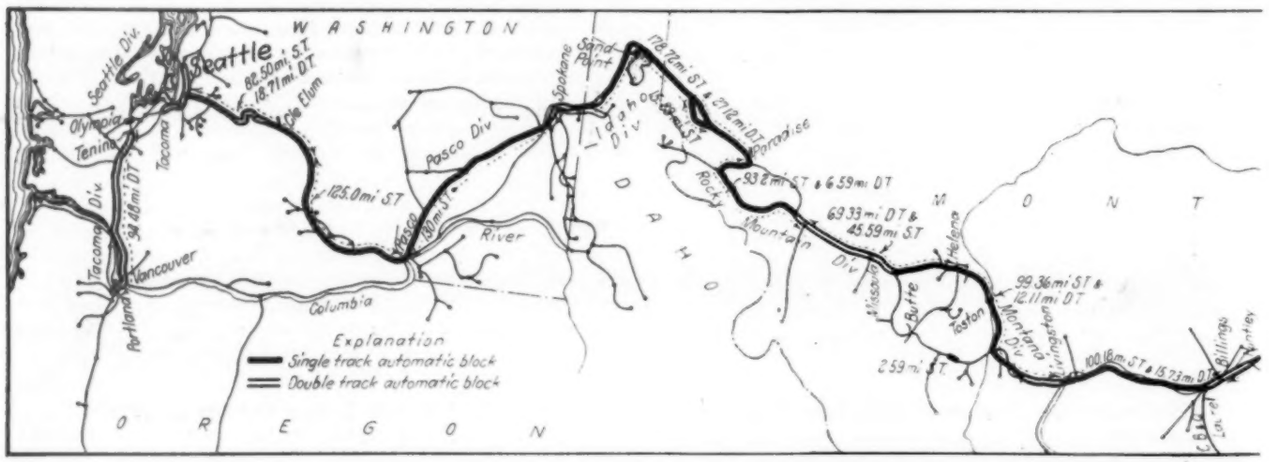
How the Program Progressed

After the completion of the signaling between Laurel, Mont., and Livingston, the first main line division out of St. Paul next received attention, the signals being completed on 61.08 miles of double track between Northtown (Minneapolis), Minn., and St. Cloud. Congestion and delays to trains approaching and leaving the principal terminal of the road required increased track capacity. Therefore, signals were installed in 1910.



Track and Signal Plan Showing Limits of Control

The portion of the line which was next given consideration was the double-track line from Staples, Minn., west 101.5 miles to Fargo, N. D. This line carries all of the traffic between St. Paul and the West and also that which diverges at Staples to and from Duluth, the traffic to the latter point being particularly heavy during the fall when a large part of the grain goes to Duluth for movement by water. As the Minnesota division passes through a well developed agricultural section, the main line as well as the numerous tributary branches serve as heavy feeders of traffic. Therefore, the traffic of this division was sufficiently heavy, particularly during the fall of the year, to require automatic signaling. This was authorized and undertaken early in 1910 and was completed and placed in service in January, 1911.



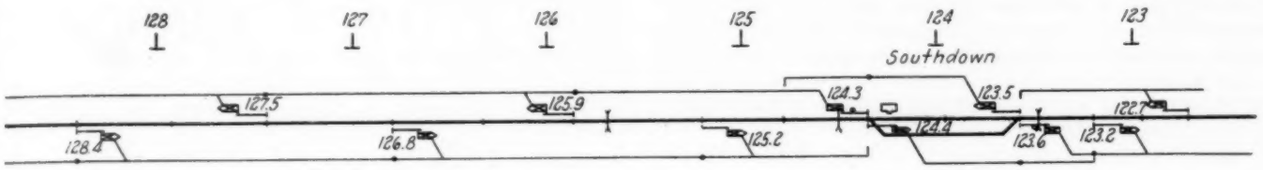
Map of Northern Pacific System Indicating Sections Equipped

The double-track line of the Northern Pacific between Portland, Ore., and Seattle, Wash., is used for 97 miles, from Vancouver to Tenino, as joint track with the Great Northern and the Union Pacific. The heavy traffic resulting from this combination necessitated that maximum track capacity be secured by reducing the spacing between trains. Therefore in 1911 signals were installed between these points in the year's work.

Having signaled the principal double-track divisions attention was again turned to single track. In 1913, 321.17 miles of single track was signaled, the longest installation being 135.5 miles on the Lake Superior division between St. Paul, Minn., and Duluth. The manual block system had been used on this line, on which an average of 19 trains a day were handled during November, 1913, but serious delays were experienced, due to the long spacing between trains required by the manual blocking.

The 1914 program included 252 miles of single-track and 46.4 miles of double-track signaling. West of Spokane, Wash., the Northern Pacific has double track or alternate lines via the Spokane, Portland & Seattle to the Pacific Coast. The Montana division from Billings, Mont., to Paradise has double track or alternate routes, except between Laurel and Livingston, which was signaled previous to 1914. Therefore it was logical that the remaining single-track division in mountainous territory, which was the 100 miles from Paradise, Mont., to Sand Point, Idaho, should be signaled next. This division follows a water grade most of the way, where because of numerous curves increased safety of train operation was fully as desirable as greater track capacity.

After an interval of three years 215 miles of single-track signaling was placed in service between Mandan, N. D., and Glendive, Mont. This territory is known as



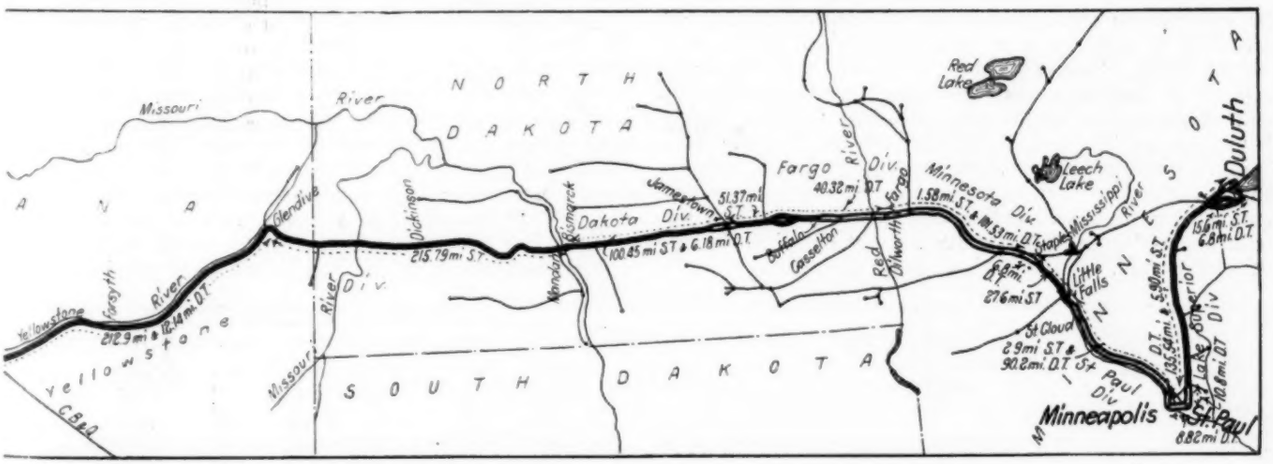
of Signals Protecting Lap and Single Siding

Spokane, Wash. The division over the Cascade mountains from Pasco, Wash., to Seattle, was then completed. With the main line signaled from St. Paul, Minn., to Fargo, N. D., with the exception of one short stretch, only three large divisions remained to be signaled.

The 212.9 miles of single track between Glendive, Mont., and Huntley follows a water level grade along the Yellowstone river. As this division lies just east of the Burlington connection, resulting in lighter traffic at that time than west of this connection, it was only logical that it should be signaled during the last of the program. The signal installation of this division was completed in May, 1920.

Between Fargo, N. D. (Dilworth) and Mandan, the 142 miles of single track and 65 miles of double track runs through rolling open country where trains can be seen for a considerable distance. This division was therefore not signaled until October, 1923. One main line division remained unsignaled, that from Cheney, Wash., to Pasco. On account of the eastbound freight traffic between these points being handled over a joint line, the Spokane, Portland & Seattle, the signaling had been delayed until last on the program.

The short section between Little Falls, Minn., and Staples, on which the signaling was completed in September, 1924, formed the last link of main line signaling. This stretch includes 27.5 miles of single track from



With Automatic Block Signaling with Mileage Given

the first and second sub-divisions of the Yellowstone division and passes through the Bad Lands where, on account of curves and low bluffs, the dangers resulting from short flagging or head-on sighting of trains are equally as bad as in the more mountainous districts.

In December, 1918, and January, 1919, signaling on two large gaps on the Montana and Rocky Mountain divisions was put in service. The 99.8 miles of track from Missoula, Mont., to Paradise and the 97.8 miles of single track from Toston, Mont., to Garrison, were signalled at this time, thus completing the signaling of one route across the Rocky Mountains from Billings, Mont., to Little Falls to Philbrook and 6.3 miles of double track from Philbrook to Staples. The signaling of this section had been postponed for years, anticipating the building of second track on the 27.5 miles. The increased track capacity afforded by the signaling will now, no doubt, serve for several years to handle the traffic satisfactorily.

Prior to the installation of automatic signals on the 100-mile, single-track division from Laurel to Livingston, it was practically impossible to get trains over the line within 16 hours; after the automatic signals were put in service, there were many cases where crews were able to make a round trip within 16 hours, such cases represent-

ing an increase of 100 per cent in the traffic capacity.

On the same division a comparison of traffic based on train sheets for 20 days before and after the automatic signals were put in service showed a reduction of 1 hour and 13 minutes in the time between terminals, or a saving in time of 15 per cent, which, it was estimated, represented an increase of 40 to 45 per cent in the traffic capacity of the division. , Also the average speed was increased from 12.54 to 14.76 miles per hour, an increase of 2.22 miles per hour, or 17 per cent.

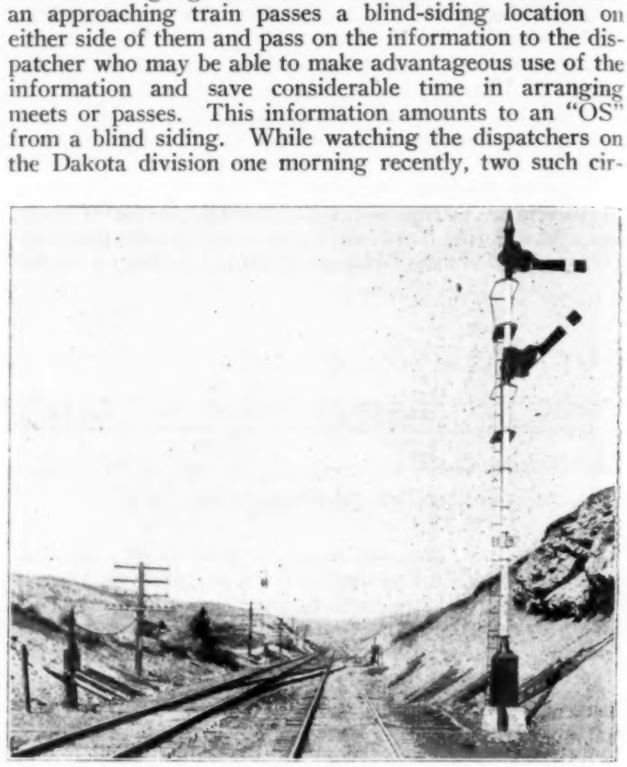
The automatic signals provided a definite space interval based on traffic requirements, the block for following trains being about one mile in length instead of from station to station as under manual block. Also, owing to the arrangements of circuits in the automatic system, there is always a caution indication before a stop indication, so that an engineman has ample time or space in which to bring his train to a stop if required, which inspires confidence and enables trains to proceed at normal speed, especially in thick weather and when the engineman's vision is restricted.

Owing to the high degree of safety afforded by the automatic signals, "19" orders are used exclusively instead of "31" orders; inferior trains are required to clear superior trains 5 minutes instead of 20 minutes at meeting and passing points and the flagging rule was modified so that a flagman is not required to go back to protect his train where he can see a stop signal at least one-half mile in the rear of his train. These features add greatly to the facility of operation and tend to increase traffic capacity without any reduction in the safety factor.

The dispatching of trains has improved considerably as the dispatchers know that trains proceed with greater uniformity with automatic block, and they are, therefore, justified in making closer meets and passes, knowing that, if a train fails to make its scheduled time, the automatic signals afford ample protection, where under manual block they must necessarily be conservative.

The trainmen soon learned to take full advantage of the information conveyed by the automatic signals. In switching at stations it is common practice for a way-freight crew to use the main line until the respective absolute or leaving signal, governing movements to the next station, goes to the stop position, thus informing them that a train is approaching and has left the next siding. Knowing the running time or mileage between stations, the way-freight crew can estimate when the approaching train will arrive and can therefore use the main line up to the last minute without delaying the approaching train. A few such cases on each division every day represent in final total a substantial saving.

In the same way telegraph operators observe the absolute or leaving signal in either direction to ascertain when an approaching train passes a blind-siding location on either side of them and pass on the information to the dispatcher who may be able to make advantageous use of the information and save considerable time in arranging meets or passes. This information amounts to an "OS" from a blind siding. While watching the dispatchers on the Dakota division one morning recently, two such circumstances occurred in which a saving of at least 25 minutes was made for each freight train concerned.



Signal with Low Arm Governing Movements into Passing Track at Bozeman Tunnel

Still another example of the information conveyed by the absolute or leaving signal is the case where an inferior train is waiting on a siding to be met or passed by a superior train. By observing the absolute signal a fireman can determine when the superior train leaves the next station and, by estimating the running time between stations, can regulate his fire so as to have steam at proper pressure as soon as the superior train clears. The utilization of this feature means a saving of coal and water.

The first low-voltage or remote-control switch machines installed in the United States were put in service

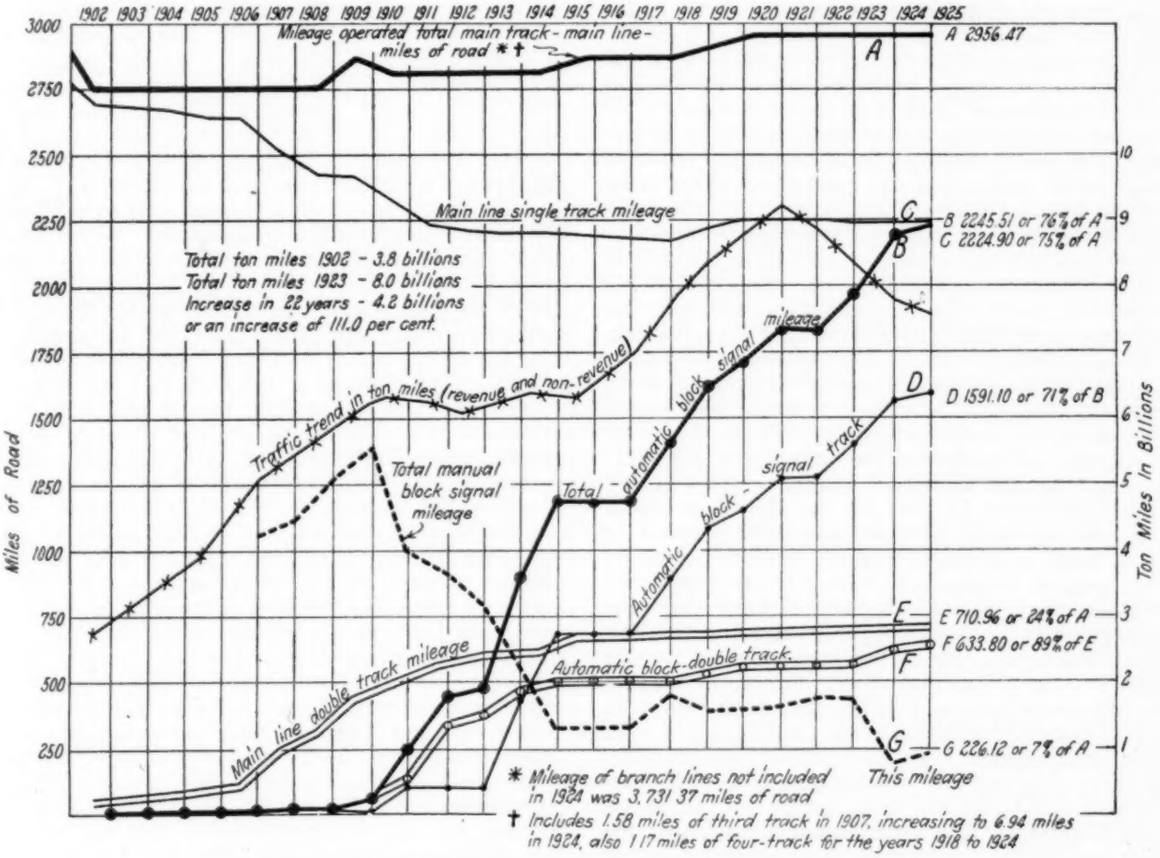
PERFORMANCE OF AUTOMATIC BLOCK SIGNALS SHOWING "TRAIN STOPS CREDITABLE TO SIGNAL SYSTEM"

Cause of Stops	1920	1921	1922	1923	1924	Total	Average
Track fouled	30	17	30	36	21	134	26.8
Switch left open	23	18	15	40	21	117	23.4
Broken rails	607	316	747	468	581	2,719	543.8
Repairs to track	95	106	73	54	58	386	77.2
Defective switch	106	77	59	100	72	414	82.8
Obstruction in switch	82	30	98	74	38	322	64.4
Derailment	127	68	52	64	52	363	72.6
Totals	1,070	632	1,074	836	843	4,455	891.0
Total number of signal movements in millions	43.8	36.6	38.7	45.9	46.3	211.3	42.3
Number of false proceed failures	13	11	12	14	11	61	12.2
Number of movements per false proceed failure in millions	3.4	3.3	3.2	3.3	4.2	3.5	3.5

Year	Maintenance Per Mile Road	Maintenance Per Mile Track	No. Signals	Maintenance Per Signal	Cost per Year Operation Per Mile Road	Cost per Year Operation Per Mile Track	Cost per Year Operation Per Signal	Maintenance—Operation Per Mile Road	Maintenance—Operation Per Mile Track	Maintenance—Operation Per Signal	Cost per Month Maintenance—Operation Per Mile Road	Cost per Month Maintenance—Operation Per Mile Track	Cost per Month Maintenance—Operation Per Signal
1913	572.4	991.1	823	54.06	31.22	37.60	66.23	38.31	46.84	120.39	79.53	83.73	10.03	5.79	6.98
1914	902.8	1,339.5	1,450	65.10	43.88	40.53	62.52	42.14	38.93	127.62	86.02	79.46	10.63	7.17	6.62
1915	1,157.6	1,633.9	1,940	62.62	44.36	37.36	59.47	42.14	35.49	122.09	86.50	72.85	10.17	7.21	6.07
1916	1,157.6	1,633.9	1,940	61.08	43.27	36.45	81.10	57.47	48.40	142.18	100.74	84.84	11.85	8.40	7.07
1917	1,200.6	1,676.9	2,013	56.62	40.53	33.77	89.55	64.12	53.41	146.17	104.65	87.18	12.18	8.72	7.26
1918	1,402.6	1,903.7	2,346	70.51	51.93	42.14	92.02	67.78	55.00	162.54	119.72	97.15	13.54	9.98	8.10
1919	1,612.1	2,107.2	2,710	71.14	54.43	42.32	100.11	76.58	59.55	171.25	131.02	101.88	14.27	10.93	8.49
1920	1,822.3	2,329.5	2,962	94.15	73.65	57.93	112.34	87.88	69.11	206.49	161.53	127.04	17.21	13.46	10.59
1921	1,822.3	2,329.5	2,962	72.92	57.05	44.87	102.05	79.83	62.79	174.98	136.88	107.65	14.58	11.41	8.97
1922	1,846.5	2,374.7	3,066	77.42	60.20	46.63	90.25	70.18	54.36	167.67	130.38	100.98	13.97	10.87	8.42
1923	1,970.1	2,503.9	3,351	92.51	72.79	54.39	85.71	67.44	50.39	178.23	140.24	104.78	14.85	11.69	8.73
1924	2,158.6	2,740.7	3,714	95.05	74.86	55.24	83.09	65.44	48.29	178.09	140.30	103.53	14.84	11.69	8.63

during 1914 at the outlying entering switches of two passing sidings situated on steep ascending grades each side of Bozeman tunnel. A lower arm was added to the automatic signal at the entering switch of each siding to govern movements into the siding. The switch machine was controlled from the telegraph office, about 3,000 ft. away, in proper conjunction with the automatic signal circuits, the arrangement being such that the operator can reverse the siding switch and set up proper signal indications for a train to enter the siding. Normally the switch and signals are set for the main line. This arrangement makes it possible to eliminate the stopping of tonnage trains on the grade to enter the siding switch and the installation has paid for itself many times. Prior to the installation of the switch machine and signals, a tonnage train stopping on the grade to enter the siding switch was forced to double into the siding.

The installation of automatic signals made it possible


1902 1903 1904 1905 1906 1907 1908 1909 1910 1911 1912 1913 1914 1915 1916 1917 1918 1919 1920 1921 1922 1923 1924 1925
Mileage operated total main track - main line - miles of road * †
A 2956.47
Main line single track mileage
B 2245.51 or 76% of A
C 2224.90 or 75% of A
Total ton miles 1902 - 3.8 billions
Total ton miles 1923 - 8.0 billions
Increase in 22 years - 4.2 billions
or an increase of 111.0 per cent.
Traffic trend in ton miles (revenue and non-revenue)
Total automatic block signal mileage
D 1591.10 or 71% of B
Total manual block signal mileage
Automatic block signal track
E 710.96 or 24% of A
F 633.80 or 89% of E
Main line double track mileage
Automatic block-double track
G 226.12 or 7% of A
This mileage
Miles of Road
Ton Miles in Billions
* Mileage of branch lines not included in 1924 was 3,731.37 miles of road
† Includes 1.58 miles of third track in 1907, increasing to 6.94 miles in 1924, also 1.17 miles of four-track for the years 1918 to 1924

Progress Chart of Signaling Program, with Traffic Trend Curve

on the various divisions to effect a considerable reduction in the number of telegraph operators. Complete figures are not available, but on the 128-mile installation on the Pasco division, between Pasco, Wash., and Cheney, 16 operators were eliminated and five sidings removed at the time the automatic signals were installed. The division superintendent reports an improvement in train operation and, as he expressed it, "a cleaner railroad from an operating standpoint."

The improved methods and facilities made possible by the installation of automatic signals as outlined in the preceding paragraphs can be capitalized with reasonable accuracy. In addition there are a number of features, which, although difficult to capitalize owing to the numerous variable quantities, materially increase the safety factor and comprise, therefore, an important part in the ultimate economical operation. Some of the these features are as follows: It was found that automatic signals provided a valuable check against failures of dispatchers, operators, trainmen and other employees. If a dispatcher issued an improper order, if an operator failed in transmitting an order, if a trainman failed to obey an order, left a switch open or a car on a siding fouling the main line, the proper signals would automatically indicate "Stop" and a train, proceeding cautiously as prescribed by the rules, would find the dangerous condition and escape an accident. Many serious accidents have been prevented in this manner. Also, trainmen soon learned to appreciate the protection which the automatic signals afforded and learned to respect and obey their indications accordingly.

The automatic signals also served as an important check against improper flagging, especially on divisions where numerous curves and the topography of the country restricted the engineman's range of vision. The modification of the flagging rule so as not to require a flagman to go back if he could see an automatic signal at stop a minimum of a half mile in the rear of his train, as mentioned in a preceding paragraph, is a valuable feature of which full advantage is not taken by some railways which have extensive installations of automatic signals.

Broken rails have been the cause of serious accidents, but as a broken rail usually breaks the continuity of the track circuit and thus has the same effect on the automatic signals as a train in the block, a "Stop" signal results. An approaching train proceeds cautiously through the block, and the broken rail is detected by the train crew or by the signal maintainer. During the year 1924, for which figures are at hand, 581 cases of broken rails were detected by automatic signals on the Northern

Pacific. One of the division superintendents said that the cost of the automatic signals would be fully justified if they did nothing else but give protection against broken rails. Sometimes trainmen, trackmen or other employees leave a main line switch open; also there are cases where a piece of metal or rock becomes lodged between the switch point and the stock rail and, although the switch lever sometimes can be forced to the normal position owing to sufficient spring or lost motion in the parts and connections, the switch point may be open far enough for the wheel flanges to enter the siding. These dangerous conditions also are detected by the automatic signals and produce a "stop" indication at the entering end of the block in which they occur. Forty open switches and 74 cases of obstructions in switches were detected by the signals in 1923. During the same year 100 cases of defective switches (switch-stand and switch connections) were detected by the automatic signals; there were probably others of a minor nature, but the important point is that even these minor defects were detected by the automatic signals.

Automatic signals are controlled by continuous track circuits, and as the track circuits extend to the fouling point of all turnouts, it is obvious that a locomotive or car standing on a siding or crossover, not clear of the main line, would cause a "stop" indication at the entrance of the block, the same as if the locomotive or car were standing on the main line. During the year 1923, 36 cases of tracks fouled were detected by the automatic signals.

The efficiency of any system or device is determined by the ratio of the number of improper operations to the total number of operations. The worst condition that can occur in any signal system is a false-clear signal which, owing to the high perfection of the apparatus and thorough, systematic maintenance, happens infrequently in an automatic signal system. A recent annual report of the performance of all automatic signals on the Northern Pacific shows 11 false-clear signals, averaging 3,329,623 signal movements per false-clear failure.

Of the 2,225 miles of road on the Northern Pacific equipped with automatic block signals, 1,591 miles or 72 per cent is single track which requires a different system from that used on double track, insofar as the control circuits are concerned, as the automatic signals must protect opposing as well as following train movements. The Northern Pacific was one of the first railways to take advantage of the General Railway Signal Company's absolute permissive block system and this system has been installed on the 1,591 miles of single track equipped with automatic block signals. The A. P. B. system comprises an ingenious arrangement of the control circuits, the mechanisms used being the same as in any automatic block signal system. The arrangement is such that the block for opposing movements is from siding to siding but for following movements from signal to signal, the same as on double track, thus providing proper safety for opposing movements and facility for following movements. In the A. P. B. system the leaving signal at each end of a passing siding is made "absolute" or "stop-and-stay" by rule while all other signals, except in certain special cases, are made "permissive" or "stop-and-proceed" as on double track. Prior to the development of the A. P. B. system there was considerable objection to the single-track automatic block system then in use, because, in order to secure proper safety it was necessary to overlap the control of the signals, which considerably reduced facility of operation.

With the exception of 56 signals installed on 39 miles of double track in 1910, all of the automatic signals and auxiliary signaling apparatus was manufactured and furnished by the General Railway Signal Company. All signals are the G. R. S. Model-2A, base-of-mast type which require, when operating the signal from "Stop" to "Clear," about the same amount of energy as is consumed by a 25-watt electric light bulb, and when holding the signal clear about 1/140 as much. As even with heavy traffic a signal is operating only a few minutes during the 24 hours and holding clear the rest of the time, the electrical energy consumed each day is very small.

The maintenance costs for ten years are tabulated under various headings in an accompany table. In 1924, the total arm movements, for the N. P. system were 46,306,579. The arm movements per stop failure, chargable to the signal system were 16,950. The last three sections installed since 1922, consisting of approximately 370 road miles, have been equipped with approach electric lighting, using double lens lamps with rebased 13.5-volt, 3.38-watt bulbs and lighting at 8.5 and 9 volts.

One of the unique features of the Northern Pacific installations is the method of letting contracts on the unit basis. About 10 years ago, units were assigned to cover all of the usual elements which comprise an automatic block signal system, and detailed plans were prepared to show exactly what apparatus and materials were included in each unit. Each single and double signal location with the various combinations of track relays and track batteries, each switch, switch indicator and cut section, also each mile of track bonded, was covered with a unit number corresponding to the plans. New units were added and old units were revised from time to time as required.

After the unit prices were established for the first contract they were easily determined for succeeding contracts by adding to or deducting from prices in the previous contract. This made it possible to secure prices and to close contracts in the early fall of each year for the next year's work without waiting for the preparation of signaling plans. The signal company was thus enabled to purchase the required raw materials and to arrange its manufacturing schedule on the most favorable possible basis for securing deliveries of finished materials on the ground at the most suitable time for carrying out the installation work, all of which brought about substantial savings in cost which resulted in lower prices to the railroad. Practically all of the automatic signaling on the Northern Pacific was installed by the General Railway Signal Company as estimates and records showed that the signal company could install the signals as cheap as the railway company because it was not practicable for the railway to maintain, during the severe winters that prevail in the northwest, an extensive installation organization and outfit that could be utilized only during the months of mild weather. Also, even assuming that the installation costs were the same, it is considered that better and more uniform work can be secured from the signal company as its representatives know that unless all work is up to specifications it will be rejected by the railway company's inspector, and have to be removed and done over. On the other hand, if work not up to standard were installed by railway forces, the signal engineer's representatives would be reluctant to incur the additional expense of having the work done over unless the defects were glaring. Interlocking plants and miscellaneous odd signaling work, however, are installed by the railway company's regular forces.

The average cost per mile of road for the Northern Pacific automatic block signaling covering the entire period 1902 to 1924 is $2,270. Due largely to the important improvements, all designed for greater operating efficiency, the present day costs of the N. P. installation would be at the rate of $3,000 per mile of road.

Railroad Operation in War Time

Tentative plans of War Department discussed at meeting of railway officers and business men

WASHINGTON, D. C.

A TENTATIVE plan prepared by the War Department for the operation of the railroads in the event of another war, in which it is not contemplated that the government will take possession of the railways unless such a step should prove necessary, but which outlines a form of organization and other provisions to apply should the emergency be considered to require it, was presented by Col. Dwight F. Davis, Assistant Secretary of War, at a convention of rail transportation officials and business men, including a large number of qurtermaster reserve officers, held at Washington on March 2 and 3. The convention was held under the auspices of the Secretary of War, to consider the part of transportation in a plan of national defense, and was one of a series of meetings with representatives of various industries. The tentative plan is to be submitted to the Association of Railway Executives and others for consideration and the executives' association has a committee which is studying the subject.

After preliminary addresses by Secretary of War John W. Weeks, Major General John L. Hines, chief of staff, and other army officers, and the presentation of the plan by Assistant Secretary Davis, addresses were made by S. M. Felton, president of the Chicago Great Western and chairman of the military committee of the Association of Railway Executives, who was director general of military railways in the World War; and R. H. Aishton, chairman of the Executive Committee of the Association of Railway Executives; who expressed the hope that it would not be necessary for the government actually to take over the roads but said that the railroads could so organize themselves as to meet almost any emergency, provided there is a proper co-ordination of the railway and military authorities so that each will understand the problems of the other. M. J. Gormley, chairman of the Car Service Division of the American Railway Association, described the organization and work of the division to show how it could function to meet a war emergency.

Opening Address of Secretary of War

Secretary Weeks said in part:

"The influence of means of transportation upon our national mobilization for an emergency, and upon our conduct of operations after an emergency arises, is so large that it may be said to be one of the controlling factors in national preparedness. In making ready to take advantage of the national system of transportation, the personnel of the army well realize the fact that civilian experts of your caliber know much more about transportation than anyone in the War Department could reasonably be expected to know. On the other hand, it is evidently impossible for you gentlemen to give the study to the use of transportation for purely military purposes which can be most appropriately given by the officers of the General Staff. In order, therefore, to take advantage of the joint knowledge of military students and of the professional leaders of American transportation, it is absolutely necessary that meetings like the present one take place.

"The subject of transportation is a very vital one to the national defense. In America we are sometimes inclined to overlook the military value of our railways. Our wars since 1865 have been overseas wars. Yet, even though our railways were not of great direct tactical importance in these wars of ours, we had occasion enough to discover how essential they were in the movement of large bodies of men. We learned how a breakdown at some interior rail center might affect the re-enforcement and supply of troops many miles away.

"If our armed forces should be compelled at some future date to defend the continental territory of the United States, the railways of the United States would assume prime importance. You know as well as I that it will not be possible for the railroads and the army to co-operate effectively immediately upon the occurrence of such an unfortunate emergency unless they spend some time together preparing and developing plans for such co-operation. That is why we have asked you to be here. You are here to lend the benefit of your expert advice so that our defense plans shall be in conformity with the actual capacities of our transportation lines. You are here to learn what our defense plans might require you to do. You are here to adjust your ideas of war-time endeavor and the War Department ideas, until the two fit closely together into a workable unit."

General Hines' Address

General Hines went more into detail regarding the services to national defense the army expected the transportation lines to render in an emergency, and pointed out something of how they could be expected to function.

"As you may know, some progress has already been made toward this end and it is hoped that this conference will take us farther on the road toward a solution, or at least a better understanding, of this potential problem," he said. So far as the purely military side of the problem of evolving a definite plan is concerned, I can state that considerable study has been given since the war to this subject and that we have formulated several fundamentally important policies resultant from such studies and our war experiences.

"Our field service regulations now definitely assign the operation and maintenance of railroads in the theatre of operations under the control of the commander-in-chief to the railway engineer troops. On the other hand, it is proposed that the actual operation of the railroads in the zone of the interior shall be in charge of the railroads themselves under such a plan for unified control as shall be agreed upon by the railroads and the government. How the railroads in the zone of the interior should be operated you gentlemen will have to determine in study of your side of the plan.

"We intend that in time of emergency, all requisitions on the railroads in the zone of the interior shall emanate from a single unit of our organization, namely, the Transportation Corps. The officials of that body will be vested with sole authority to call for equipment to meet the demands for the movement of men, animals and material. Competition among army shippers will be eliminated."

Brig. Gen. W. W. Atterbury, vice-president of the Pennsylvania and formerly director general of transportation of the American Expeditionary Forces, was expected to address the meeting on "Operation of Military Railways in France" but was unable to be present.

Assistant Secretary Davis gave a general outline of the

plans for industrial preparedness being worked out in the War Department under his direction and Maj. Gen. W. H. Hart, quartermaster general of the army, gave an "Outline of the Quartermaster Corps Program," after which Mr. Davis presented the tentative plan as follows:

Tentative Plan for Operating in War Time

I wish to present to you the tentative plan of the War Department for the control of railroad transportation in the event of a major emergency. Let us first briefly consider the existing legislation on the subject.

The Army Appropriation Act passed in August, 1916, contained the following clause: "The President, in time of war, is empowered through the Secretary of War, to take possession and assume control of any system or systems of transportation, or any part thereof, and to utilize the same to the exclusion as far as may be necessary of all other traffic thereon, for the transfer or transportation of troops, war material and equipment, or for such other purposes connected with the emergency as may be needful or desirable."

This law is still in effect, as it is not limited to any particular emergency. The Transportation Act of 1920 provides that: "Nothing in this Act shall be construed as affecting or limiting the power of the President in time of War (under the proviso above quoted) to take possession and assume control of any system of transportation and utilize the same."

It is not contemplated that the government will take over the railroads in time of war unless the emergency is such that the railroads need the backing of the government to insure continuous and efficient operation; and unless in the opinion of the President such a step is necessary as a matter of national safety.

To meet such a contingency the War Department has prepared a tentative plan. Careful consideration has been given not only to the experience of the United States in the late war, but also to experience abroad in handling similar problems. An attempt has been made to prepare a plan which is best adapted to the genius of our American railways.

Our experience in the World War will have been in vain if we do not read aright the lessons of that war, and make definite plans to provide greater efficiency in national defense for a possible future emergency. Such a plan should be a clear and true statement of the lessons based on historical fact. Before presenting the tentative plan of the War Department for the control of the railroads in a major emergency, we must realize clearly the limitations of such a plan. The President of the United States and the Congress have certain constitutional war powers, which are well known. It is the duty of officials of the War Department and officials of industry to give to the President and to the Congress, upon request, facts with which they are familiar or opinions based upon mature and careful thought. But neither the President nor the Congress can be bound by such plans made in advance. War is an emergency, and war plans must necessarily be tentative in nature, and flexible to meet changing conditions. Subject to the limitation that our present plan is the result of our most careful thought, but can in no way be binding upon those who may be charged with the responsibilities of government in any future emergency. I will now present to you the tentative plan of the War Department:

Plan for the mobilization and coordination of the systems of transportation in case the President, in time of war, exercises the powers conferred upon him by the Army Appropriation Act of August 29, 1916.

The railroads should not be taken over by the government unless the emergency is such that in the opinion of the President this step is necessary in order to insure the efficient prosecution of the war.

In case the government takes over the railroads the plan adopted will be based on and should give effect to the following principles:

1. Possession and control by the government of the lines taken over is essential in order that the government, in carrying out the war program, may make the necessary demands upon the railroads and insure obedience to these demands as a matter of right.

2. Effective mobilization and use of the transportation resources is impossible unless the lines taken over are operated as a single system under one control and one administration.

3. Requirements of the government can be carried out most effectively, intelligently and successfully by availing of the existing organizations of the several companies and by making full use of the trained experience and skill of their personnel. Too violent changes in either organization or methods of procedure are liable to have an adverse effect on efficiency and morale.

To carry these principles into effect the following plan is proposed:

I.

The power of the President to take possession and assume control of the systems of transportation will be exercised through the Secretary of War as provided by the Army Appropriation Act of August 29, 1916.

The Secretary of War will select an executive assistant who will direct operations and will be responsible for the execution of such policies as are outlined by and with the approval, or by the authority, of the Secretary of War.

The Secretary of War will also be assisted by a committee of railroad presidents, to be known as the Executive Committee, the members of which will be nominated by the Association of Railway Executives and approved by the Secretary of War. The committee will be subject to the direction of the Secretary of War and will be the medium through which the mobilization and coordination of the systems of transportation will be carried out, and effective and cooperative operation secured, and through which orders shall be given to the individual carriers; but these orders should, as far as possible, be confined to matters of general policy, and to such other matters as are clearly necessary to carry out the purpose of the government in the emergency. It should be the fixed policy of the committee in carrying out this plan, to make the maximum use of individual companies as corporate organizations, and not to interfere with any company in matters of management, operation or domestic arrangements, except when such interference may be absolutely necessary.

The Secretary of War may in the exercise of authority delegated to him by the President of the United States in accordance with existing law be called upon for action in such important matters as the following: First, his authoritty may be invoked in any emergency with which the executive assistant or the Executive Committee cannot successfully deal; Second, he may be available as an intermediary through whom, when necessary, any conflicting demands, or any matters involving questions either of national policy or of justice to the railways, can be settled or brought before the President for final decision. Except in cases where, in his opinion, the government's interest require him to take an active part, it should be the policy of the Secretary of War to encourage the initiative and management of the executive assistant by placing upon him the responsibilities of general management.

II.

In order to avoid demoralization, as far as possible, of the working forces and of the management of the individual lines, and to obtain the advantage of the experience and organized personnel on the several railways, the actual operation and control of the individual railroads should be left in the hands of their executive staff and organization, subject to the control and direction of the above mentioned executive assistant.

III.

The property taken over should be all property used in transportation, the materials and supplies on hand at the time possession is assumed, all balances in the account or accounts representing the total of "net balances receivable from agents and conductors" as of that time, and a working fund, if in the treasury of the company, not exceeding an amount necessary ordinarily to cover one month's operating expenses. All these should be credited to the company.

IV.

The United States should pay, out of the funds thus coming into its possession or otherwise, the expenses of operation of the company unpaid at the time possesion was assumed, and charge the same to the company.

It should likewise pay just compensation for the use of the

property during federal control, to be determined as hereinafter provided, and should also pay all taxes accruing during federal control, except such additional war taxes as may be levied in connection with the then existing war. All revenues from operation during federal control should belong to the United States, and all expenses of operation during federal control should be paid by the United States.

V.

Compensation to be paid to carriers should be a sum equivalent to the average annual net railway operating income for the three years ended on the 31st day of December next proceeding; except that if exceptional or abnormal conditions were found by the President to exist during all or a substantial portion of such period of three years which justify a larger or smaller compensation, such larger or smaller compensation as may be found to be just and equitable should be provided for, and in any event due allowance in the compensation should be made for the use of additions, improvements, or equipment, the use of which was not fully reflected in the operating railways income of the said three years or a substantial portion thereof. The compensation should be paid to each carrier in quarter-annual payments promptly at the end of each quarter.

VI.

A contract should be entered into stating and defining the rights and obligations of the parties, and should, among other things, contain: First, a description of the properties taken over; Second, provisions for operation and accounting during federal control; Third, provisions for the maintenance and upkeep of the property during federal control and its return to the owners at the end of federal control in as good order and condition as when taken over; Fourth, for the payment of taxes; Fifth, for the statement of compensation and its payments; Sixth, for the method of making additions and betterments to the property during federal control and to whom chargeable and how paid for; Seventh, for final accounting and return of the properties to their owners at the end of federal control.

VII.

In the event the President acts again under the above mentioned amendment to the Army Appropriation Act of August 29, 1916, it will be necessary to obtain legislation from Congress to empower him to enter into agreements with the carriers in respect to compensation. The character of the federal control Act will, of course, be important. It should take into consideration not only the military requirements, but also the needs and rights of the carriers who will cooperate in the execution of this plan.

This tentative plan will be submitted to the Association of Railway Executives, and to other interested parties. It is hoped that those who are most competent will give to it serious consideration.

Mr. Felton discussed the general features of the plan in part as follows:

Discussion by S. M. Felton

In the consideration of tentative plans for securing the maximum efficiency in transportation, supplies and material in the event of war or threatened war, the large place occupied by transportation comes to the fore and it is recognized by the railways that intensive study should be given to this matter with the view of producing the best results and that the united experience of the railways be placed at the service of the government for the determination of the most effective method of handling any emergency situation.

It is my opinion that it should never again become necessary for this government to take over the operation of the railways; certainly not if we never are drawn into a war. Should we be unfortunate enough to become involved in a war, and should that war produce an emergency that would require the taking over of the railroads, the brief law now on the statute books gives the President that power. However, the coordinated efforts of the railroads, exercised through the Association of Railway Executives and the American Railway Association, should constitute a machine capable of handling almost any situation created by war, unless indeed the theater of operations of such war were on our own soil.

The problem as I see it from my experience with these matters is not so much a coordination of facilities as it is a coordination of ideas, in other words, a meeting of minds by the military people and the railroad people, so that each may understand what the other's problem is and then proceed to carry out whatever may be necessary to meet that problem.

As I understand the tentative plan submitted by the War Department for the consideration of the railways, it enunciates certain principles as a frame work on which to develop a completed plan and, briefly, provides that the railroads should not be taken over by the government, but should be permitted to function in their normal manner, unless the emergency is such that in the opinion of the President this step is necessary in order to insure the efficient prosecution of the war. Should, however, the emergency arise and the government take over the railways that it would be done in order that the government in carrying out the war program might make the necessary demands upon the railroads and insure obedience to these damands as a matter of right. That there must necessarily in that event be a central control somewhere, and it is proposed that this central control shall be vested in the Secretary of War, who also acts as chairman of a committee of his selection of railway executives with an executive vice-chairman in charge of operations.

This brings about immmediately what I refer to—the coordination of ideas, and the power vested in the Secretary of War can be delegated by him in any manner that he may see fit. The other important point, as I see it in the plan, is that it disturbs in no way the existing organization of the several railway companies, but does make full use of the trained experience and skill of their personnel. In my opinion this is one of the things that is absolutely essential to bring about success in any plan and to bring about the most efficient handling of transportation.

There is a lot of detail in the plan that, no doubt, will require working out into definite form, such as providing the terms on which the roads are taken over, the terms on which they will be returned, the question as to money spent for war purposes through capital expenditures, who will pay for them and all those kind of things. These are details that will go into any final contract. The main thing is to provide the backbone of the plan. The rest of it will work out in my opinion without difficulty.

Bear in mind at all times in the consideration of this that these railroads are officered and manned by as high a type of manhood as there is in any industry in the country; that without the power of exercising military discipline there is maintained a degree of discipline and obedience to orders within this organization that is only paralleled by that in the armed forces of the country; that the capacity of these railroads can be expanded under emergency to handle any military load that may be possible to put on them, with very little, if any, interference with the industrial business of the country; that in the extreme event of there being an invasion of this country, keep in mind that the theater of operation is entirely different from what might be termed the zone of the interior and requires different handling.

But, so far as the zone of the interior is concerned, if the principles as enunciated in the tentative plan provide for the full utilization of the existing organizations of the several railway companies, and if it does make full use of the trained experience and skill of their personnel, and if the control of their operations is through a definite vested authority in the Secretary of War, who above all officers of the government has a direct responsibility and a knowledge of what is necessary for the conduct of the war, the plan as submitted would seem to indicate one method through which the best service could be secured.

When the plan is submitted to the railways it will receive their very careful consideration together with that of others interested, with the view of developing the final plan that in the opinion of everybody will produce the best results, but I want again to reiterate the hope that it should never again become necessary for this government to take over the operation of the railways.

Mr. Aishton Says Railways Can Meet Emergency

Mr. Aishton said that most of the difficulties that block efficient operation are due largely to the lack of understanding on the part of men of different interest of each others "language" and what they are trying to bring about. The railways must know what the army wants and the army must know what the railroads can do to carry out what it wants. After that one of the important points is "not to stop anything that is going for fear that you may not be able to start it again," and not to interfere by too much reorganization with the operating staffs. He said the railroads have learned much since the war and that much of what they have accomplished has been made possible by learning "the other fellow's language," and by co-operation between the roads, the Interstate Commerce Commission and the shippers to anticipate the transportation needs of the country and the equipment needed to take care of it. The railroads and railroad men are used to emergencies, Mr. Aishton said, and no matter what the emergency may be there are resources sufficient to meet it and give the military arm of the government every support that can possibly be secured for it provided the problem of how to co-ordinate with other activities is worked out. He continued:

The principle objective of the use of railways as a military necessity is ultimate victory. To assure such a victory the railways, while organized and developed to further the arts of peaceful commerce, are the most effective agent of warfare, enabling as they do the quick mobilization of large forces, the rapid assembling of the necessary machines of warfare and keeping the armies in the field fed, clothed and provisioned. Outside the theater of war or in the zone of the interior the railroads will in our opinion best serve the country if operated by the companies operating them in times of peace with their regular organization and personnel under such direction as will reconcile conflicting orders, insure harmony of working and offer the fullest guarantee that military requirements as well as the requirements of industry will be met so far as the capacity of the railways and safe operation will permit.

As you know, the railways maintain as a part of the American Railway Association what is known as the Troop Movement Section, here in Washington, in direct contact with the Quartermaster General. While this is only a nucleus it is, however, capable of expansion over night into a fully developed operating machine, and, in addition, and as a preliminary to the tentative final plan of operation as it may be submitted, and at the suggestion of the War Department, a definite point of contact has already been established and is now functioning through the American Railway Association's Car Service Division, and its district managers, with the arm of the military service engaged in making a study of procurement. This is a nucleus that can be expanded at any time to meet any of the various problems relating to service, car supply, transportation and all that kind of thing that may arise during the study of this entire subject by the War Department, or in the event of any sudden emergency arising is prepared to immediately take whatever steps common sense and necessity might dictate.

The whole problem of transportation as related to military necessity in the zone of the interior comes right down to this. The railways of this country can handle any load that can be put on them to meet the military necessities of the country without serious interference of the ordinary commercial business of the country, provided:

1. The operating companies continue to operate them in war as in peace, with no disturbance of their organization and personnel.

2. There be provided a coordinating authority who can reconcile conflicting orders and agree on a definite program to be followed out.

3. A recognition that the limiting factors of the whole transportation machine are the ability to promptly load at point of origin and promptly unload and dispose of at point of destination, and that if these two things are done the available equipment, personnel and facilities are ample to meet any emergency.

The railways are justly proud of their part in developing the United States. They are made up as other industries are made up of just so many human units and should necessity require it would be galvanized into a solid unit of action to defend the country they so liberally contributed to in the upbuilding.

The Railways as an Engine of War

This great nation has at its service today the most wonderful engine of war that has ever been developed in any time or in any country. In its 258,314 miles of railroads, its 68,990 locomotives, its 56,066 passenger cars, its 8,662 Pullman and sleeping cars, its 2,380,482 freight cars, its total investment of $21,385,094,369, all set and kept in motion at the highest pitch of efficiency by a civil army of nearly two million officers and men, the problem before you is not one of setting up another machine or another organization, but of how best to co-ordinate this tremendous engine of war with all your other activities.

Other Discussion

Mr. Gormley said the Car Service Division today is organized in such a way that it could readily function as a war machine and can meet any sudden demand for cars at any time. It has all the authority requisite to meet any emergency of war or peace and if the War Department should call on it for 1,000 cars at any time they could be delivered at the desired point before the material could be got ready to load them.

Brig. Gen. A. C. Dalton, chief of the transportation service of the quartermaster corps, discussed "Problems of Government Transportation." He said that success depends upon the degree of co-ordination of the railways with other activities more than upon anything else. It is essential that the railways establish a central agency and the War Department a similar one organized in such a way that the machine so established can be put into operation without delay. He also spoke of the necessity of establishing a "super" federal traffic agency to co-ordinate the various demands for transportation and to establish priorities. He said the difficulties experienced in 1918 were not due to the failure of the railways to furnish transportation but to the utter lack of a plan for co-ordinating the military and commercial traffic requirements. The railways were efficiently operated both before, during and after federal control. General Dalton, after discussing various details of this subject, proposed a plan for co-ordinating all the transportation facilities of the country and that the essential elements were provision for expansion only rather than organization and reorganization.

Lieutenant Colonel M. R. Hilgard discussed the subject of "Supply and Transportation," illustrated with maps, and called on Mr. Aishton to explain the railroad problem of transporting 18 divisions from 18 mobilization

points throughout the country to concentration points in the East. Mr. Aishton said that as part of the railways' share in a preparedness program the Troop Movement Section had been retained after federal control and that the manager, C. S. Stewart, was in constant touch with the quartermaster general's office, studying the requirements. In an emergency a representative of this section would be stationed at each point of mobilization to keep in touch with the requirements and with the various railways involved and to illustrate how such a large movement would be handled, he described briefly the procedure in transporting one division, with its supplies and equipment, from San Antonio, Tex., to Alexandria, Va. The most important point, he said would be to distribute the movement via various routes and he gave the figures for the number of cars of each kind that would be required and pointed out the nine routes over which the movement might be distributed, in such a way that the additional load on each road would be comparatively small. The routes would range from 751 to 956 miles, he said, but the difference in distance would cut little figure in comparison with the increased facility with which the movement could be accomplished. About ten days would be required for this movement. To move the entire 18 divisions at the same time he said would merely involve multiplying the organization and routes, etc., by 18.

[Brig. Gen. Edgar Jadwin, of the Corps of Engineers, presented a paper on "Operation of Railroads in the Theater of Operations" which will be published in a subsequent issue of the *Railway Age*.—EDITOR.]

The Railway Supply Industry*

An outline of the extent of the industry—Some of its problems—Effect of thoughtless criticism

By Samuel O. Dunn
Editor of the *Railway Age*

FEW people have anything approaching an adequate idea of how large and important the railway equipment and supply industry of the United States is. It is both absolutely and relatively larger and more important in this country than in any other in the world. This is due to two facts. First, it purveys especially to our own railroad industry; and the railroad industry is larger and more important in this country as compared with other industries than it is in any other country. Secondly, our railways have confined themselves more closely than those of most other leading countries to their essential function of operating and maintaining facilities of transportation and have ventured less into the business of manufacturing.

What is meant may best be made clear by contrasting the policies of our railways and those of Great Britain. The British railways build practically all their locomotives and cars in their own shops. The building of locomotives and cars in independent manufacturing plants in that country is carried on chiefly for export. Throughout the history of our own railways it has required about all the capital they could raise to extend, enlarge and improve their plants enough to handle the increasing traffic available and to effect improvements in their permanent structures which, together with improved locomotives and cars furnished by outside manufacturers, would bring about the maximum economy in operation. This policy of our railways in virtually abstaining from the manufacture of equipment, devices and materials has made necessary and has resulted in the development of our enormous railway equipment and supply industry.

The vastness of this industry is best illustrated by statistics showing the magnitude of the purchases made from it by the railways. I do not believe any estimate of the total purchases of our railways ever made has been large enough. Past estimates usually have been based upon the operating expenses of the Class I roads (excluding switching and terminal companies). An adequate estimate must also include purchases charged to operating expenses by the switching and terminal companies and by the Classes II and III roads, and, finally an estimate of purchases of equipment, materials and supplies made by all roads which are charged to capital account.

*From an address made at the regular monthly meeting of the Western Railway Club, held February 16, at the Auditorium Hotel, Chicago.

Railway Purchases in 1923 Total about $2,728,000,000

The purchases of materials and supplies made by the Class I roads (excluding switching and terminal companies) in 1923 and charged to operating expenses were approximately $1,266,000,000. Their expenditures chargeable to capital account were $1,059,000,000, but of this amount about $219,000,000 was paid in wages to railway employees. The balance of $840,000,000 chargeable to capital account must have been paid for equipment and supplies. Therefore, the expenditures of the Class I roads for equipment and supplies (not including fuel) amounted to approximately $2,106,000,000. This figure must be increased about 3½ per cent or approximately $74,000,000, to include purchases made by the switching and terminal companies and the Classes II and III roads. This indicates that total purchases made by the railways from equipment and supply manufacturers amounted to $2,180,000,000. In addition, the railways as a whole (including switching and terminal and Classes II and III companies) paid about $547,500,000 for fuel.

This makes a grand total of approximately $2,728,000,000 that the railways in 1923 paid to outside companies for equipment, materials, supplies and fuel. Let us briefly consider how these vast purchases were divided among the various lines of business which together constitute the railway equipment and supply industry. In doing this we must exclude the expenditures made by the switching and terminal companies and Classes II and III roads because of the impossibility of analyzing them with any accuracy.

The purchases made by the Class I roads, and charged to operating expenses, have been analyzed by R. H. Aishton, president of the American Railway Association. These roads in 1923 paid $232,500,000 for forest products which were charged to operating expenses. They charged

to operating expenses $465,000,000 which was paid for iron and steel products; $57,245,000 for copper, zinc, lead, babbitt, etc.; $15,678,000 for lubricating oils and grease; $6,120,000 for cement.

President Crowley of the New York Central has called attention to some other kinds of purchases which seem small compared with those that have been mentioned, but which in dollars and cents are large. The railways spend $1,300,000 a year with manufacturers of fireworks for fusees and torpedoes; $2,000,000 for dining car linen; more than $1,000,000 for china; $300,000 for red, blue, green or white bunting for signal flags, etc. I quote the following from an address that Mr. Crowley recently made at Pittsburgh:

"A fair estimate of the portion of Class I railroad earnings distributed annually among manufacturers of paper, pens, pencils, ink and other items which come under the head of stationery, and to printers, would be $19,000,000.

"The railroads are good customers of the farmers, too. In dining cars are served annually approximately 8,000,000 pounds of beef. It takes a herd of more than 30,000 cattle to supply this beef, for only the choicest cuts are served in dining cars. Two million pounds of ham, 1,750,000 pounds of lamb chops, and 3,500,000 pounds of other meats, 3,250,000 pounds of butter, 6,000,000 quarts of milk, 27,000,000 eggs, 16,000,000 lb. of potatoes are among the items served annually in dining cars." The expenditures of the railways for fuel pay for 28½ per cent of the bituminous coal produced, over 5 per cent of the anthracite and about one-fifth of the fuel oil produced in the country.

In addition to all these purchases which go into operating expenses, there must be considered, as I have already indicated, the purchases of equipment and materials charged to capital expenditures, which amounted for the Class I roads in 1923, as already shown, to approximately $840,000,000. These purchases include indirectly all the iron, steel, lumber, cement and innumerable other things which are used in constructing locomotives, cars, tracks, shops, bridges, stations and so on.

The facts that have been mentioned call for emphasis upon certain points. One of these is the dependence of the railways upon the equipment and supply manufacturing industry. It has undoubtedly been fortunate for our railways that they have engaged in the manufacturing of equipment and supplies only to a very limited extent. Developing and operating a railroad, and carrying on a manufacturing business, are two widely different things. The primary and vital function of a railroad is to furnish transportation. It necessarily follows that if it engages in manufacturing to supply its own needs, its business as a manufacturer will be completely subordinated to its business as a transportation concern. The manufacturing part of its business cannot and will not be given the attention and supervision by its higher officers that they must give to its transportation business. It may try to keep the accounts of its transportation and manufacturing businesses separately. But overhead expenses are a very large part of the expenses of any business. When an attempt is made to conduct two kinds of business, it is very unlikely that the overhead expenses will be properly allocated; and in consequence the management is quite likely to mislead itself as to the costs it is actually incurring in carrying on the two kinds of business.

Furthermore, when the railways purchase equipment and supplies they usually buy from concerns which are engaged in active competition and which in consequence are making constant efforts to reduce their production costs in order that they may be able to undersell each other. Manufacturing carried on by a railroad itself is not subject to this direct competition and, therefore, in the manufacturing operations of a railroad there is necessarily lacking the strongest of all incentives to increase efficiency and reduce costs.

There is another feature which is of great importance. In Great Britain, because of the fact that the railways have followed the policy of building their own equipment, there has been not even a remote approach to standardization in construction and maintenance, whether as to types, dimensions or devices used. In this country, owing to the fact that independent manufacturing companies try to make equipment and supplies for all the railways, there has been brought about a much closer approximation to standardization in various ways. This has promoted the mass production in which the United States leads the world, and which is the principal reason why our manufacturing industries, as well as our railroads, can carry on their business at lower unit costs in proportion to the wages paid per employee than the industries of any other country.

The fact, however, that our railways do buy practically all their equipment and supplies from manufacturers makes them peculiarly dependent upon the manufacturers in certain ways. They must largely depend upon the manufacturers to invent, and furnish the capital for placing upon the market, new devices which, if bought and used by the railways, will result in savings of labor, fuel and material. They must depend very largely upon the manufacturers for the development of locomotives of increased hauling capacity, cars of better construction, and draft rigging and other devices of greater strength, which will make it possible to haul more freight per car and per train without any corresponding increase of operating and maintenance expenses. Illustrations of the extent to which the railroads are dependent upon the manufacturers of equipment and supplies for improvements which will help the railways to render service better and more economically might be multiplied endlessly.

Tribute to Inventive Genius of Railway Officers

It would present a false picture not to give prominent mention to the fact that a large part of the improvements which have been made year after year in equipment and devices of all kinds have been originated by the inventive genius and enterprise of railway officers. Even in such cases, however, the usual practice has been for the railway officer, while giving his own road the benefit of the improvement, to sell it to some manufacturer to market with other railroads. Furthermore, it is probable, that most of the important improvements in railway equipment and devices in this country have been originated by the manufacturers as well as placed upon the market with capital which they have furnished. It would be impossible to over-estimate the contribution which has been made by the railway equipment and supply manufacturers of the United States to the efficiency and economy in operation in which our railroads long have led the world, and never to so marked a degree as now.

The past policy of our railroads in relying upon manufacturing concerns to do their manufacturing has been justified by past experience and continuance of it is warranted by present and prospective conditions. If this policy is to be continued, it will be needful in the future, as it has in the past, for railway officers to give the most hospitable consideration to every suggestion for the improvement of railway equipment, tools and permanent structures which may originate with manufacturers and individual inventors. In view of the great progress that has been made year after year, there does not seem to be justification for the complaints sometimes

heard that railway officers are not hospitable to new ideas. They are just as hospitable to new ideas as any other class of business men. Every business man tends to regard with skepticism any scheme presented to him the adoption of which would involve radical changes in his methods or machinery. It is said that when George Westinghouse presented the idea of the air brake a certain very great railroad man ridiculed the notion that his trains could be stopped with "wind." It was not many years after that, however, until all our trains were being stopped by air.

The very fact, however, that all business men are skeptical regarding revolutionary ideas and that many are very conservative in their attitude toward all radical changes, commonly makes it necessary for a manufacturer to incur losses for a long time in trying to market a new device. This fact should always be considered—although it is not always—in connection with the price that must be paid for the device when a market finally has been established for it.

This thought brings to us a second point regarding the relations between the railways and the railroad supply industry which is of great importance. Those who speak on behalf of the railways have been engaged for years in emphasizing to the public the fact that the railways must be allowed to prosper if they are to be able to furnish the public good and adequate service. Exactly the same line of reasoning leads to the conclusion that the railway equipment and supply industry must prosper if it is to serve the railways well and adequately. Henry Ford is the most successful manufacturer in the world. The following incident about him is given upon good authority. A small manufacturer proposed to furnish him certain materials at a price so low that Mr. Ford doubted if it would be sufficient to enable the small manufacturer to produce at a profit. He had the concern's accounts examined and his suspicion was verified. He, therefore, insisted upon paying for the materials at a higher price than that for which they had been offered to him. His line of reasoning was that if he accepted the price proposed the concern would lose money, and in time would cut off his supply of the materials it was to furnish, with the result of interfering with the operation of his entire automobile plant. He could much better afford to pay a higher price than take the risk of any such result. He based his decision as to the price he would pay, not on sentiment, but on sound business principles. The equipment and supply industry of this country constitutes the railroads' "service of supply." It is desirable that it should prosper in order that the railways may always have a good and adequate "service of supply."

Fluctuations of Railway Purchases Costly

Railway purchases are subject to wide fluctuations, and in consequence, of course, the business of equipment and supply companies is subject to corresponding fluctuations. These fluctuations are costly both to the equipment and supply companies and to the railroads. When railway purchases greatly decline, competition between the manufacturers for the reduced business causes sharp reductions of prices. Meantime their overhead expenses cannot be much reduced. This means that their unit costs of production actually increase at the same time that their prices are reduced; and many of them lose money. When business becomes good again the railways all enter the market at once. Active competition among them for the output of the manufacturers puts prices up. Then many prices rise to abnormal heights.

There can be no doubt whatever that over a period of years these great fluctuations in railway purchases substantially increase the average unit costs of production of the manufacturers and the average prices that the railways have to pay. The manufacturers would make more profits and the railways would get lower average prices if railway purchases were made more uniformly year by year.

Can railway purchases be made more stable? Nobody can answer this question unless he can also answer the question whether we can secure the adoption of an improved policy of railway regulation. The policy of regulation which has been followed for years has kept the railways operating constantly on too narrow a margin of profit. The result has been that every decline of their traffic and total earnings, even though relatively small, has forced them greatly to reduce their expenditures for new equipment, other improvements and maintenance. Owing to this policy of retrenchment, which has been absolutely necessary on many railways if they were to avoid deficits and even receiverships, hundreds of thousands of men have been laid off and purchases have been reduced by hundreds of millions of dollars. Then when traffic and earnings have increased and deferred expenditures for equipment, improvements and maintenance have had to be made, there has been a wild scramble to increase forces of employees and to buy equipment and materials.

The bad effects of these wide fluctuations of railway purchases have not been confined to the railroads and the railway supply industries. They have been felt throughout the industry and commerce of the country and by every class of its people. They have increased unemployment in periods of depression and intensified the demand for labor in periods of prosperity. They have made general business much worse than when it would not have been good anyway, and in periods of prosperity they have helped largely to cause the inflations which have overstrained the financial resources of the country and made inevitable subsequent periods of depression and deflation.

The management of the railways could do considerable without assistance from regulating authorities to reduce the fluctuations in railway purchases. All past experience shows that when traffic is reduced it is but a matter of time until it will increase again to record breaking proportions. The more prosperous roads could make larger purchases in periods of depression and thereby do more than they usually have done to prepare for periods of business activity. If all the prosperous roads should follow this policy they undoubtedly would get equipment and supplies at lower average prices than they otherwise would and at the same time help to prevent such wide fluctuations of general business and prices as now occur.

It is undoubtedly true, however, that a majority of roads are obliged by their financial exigencies to increase and reduce their purchases as their traffic and earnings vary. Secretary of Commerce Hoover is the leader in a movement for reducing wastes in industry. Some very large wastes in the railroad and railroad supply industries, and in the industry of the country as a whole, could and would be reduced if the government would adopt a policy in regulating the railways which would enable the roads to make purchases more uniformly from year to year. The Interstate Commerce Commission and a committee of railway executives appointed by the American Railway Association are engaged now in a study of means by which employment in the railroad business may be stabilized. Any policy which would stabilize employment would also stabilize purchases. No policy which may be adopted, however, will stabilize employment and purchases unless it will also make railway net operating income more adequate and stable. Railway employment and purchases always have varied and always will vary pretty closely with the railway net operating income earned. A large

decline in net is always accompanied or followed by a decline in employees and purchases. A large increase in net is always accompanied or soon followed by a large increase of employees and purchases.

This suggests a point of importance with which I shall conclude this address. For reasons already stated, the railways are largely dependent on the railway equipment and supply industry for improving and adequately furnishing equipment and supplies. On the other hand, the railway equipment and supply industry is not only dependent upon the railroads for business, but the volume of business they can get from the railways from year to year and period to period depends upon the earnings of the railways, and especially upon the amount of net return they earn. There are numerous concerns, large and small, which depend entirely upon the railroads for business. There are almost innumerable concerns which depend largely upon the railroads for business. Since a very large part of the manufacturing industry of the country, as well as a large part of the producers of raw materials, directly and indirectly depend largely, and many almost wholly, upon the railroads for business, it is to their selfish interest not merely passively to favor, but actively and energetically to advocate and promote, a policy of regulation which will enable the railways to prosper.

Criticism Which Proves a Boomerang

Unfortunately many of those who are directly and indirectly dependent upon the railways for business do not recognize this fact and act accordingly. Through the Railway Business Association and other channels the railway equipment and supply industry has fought long and ably for a reasonable policy of regulation. It is not uncommon, however, to hear traveling salesmen representing concerns whose prosperity depends upon railway purchases criticising the surcharge on Pullman tickets. It is not uncommon to hear men connected with concerns that depend upon the railways for business complaining about freight rates.

The railways cannot contribute their full share to the prosperity of the country, either through the service they render, the number of men they employ or the purchases they make unless they earn adequate net returns. Any man—and especially any man who is largely dependent upon the railroads for business—who criticises their service or rates without having first informed himself as to how well the railways have been and are doing financially simply talks regardless of the interest of his own business and of all the business of the country.

As a result of readjustments of conditions which have been steadily going on for about four years the prospects of general business appear to be better than they have been at any time in ten years. This situation seems to ensure to the railways a substantial increase of traffic. As a result of the increase of traffic that began last fall, and of the large reductions of operating expenses that the railways have effected by increased efficiency of management, the railways, as a whole have been for about six months earning a more nearly satisfactory net return than they have earned in any equal period since 1917.

With the prospect of an increase in traffic, and so many railways earning good net returns, the great industry which makes equipment and supplies for the railways, and also, the industries from which it buys raw materials, must be entering a period of unusual prosperity.

Let all of us who are especially interested in the railroad and railway supply industries join in efforts to manage our own affairs and influence government regulation of the railways so that we will contribute toward making this period of prosperity a prolonged one.

Freight Car Loading

WASHINGTON, D. C.

REVENUE freight car loading in the week ended February 21 amounted to 925,295 cars, an increase of 79,596 cars as compared with the corresponding week of last year, which included a holiday, and of 95,108 cars as compared with 1923. This was also an increase of 22,000 cars as compared with the loading for the previous week, which included a holiday, but a decrease of enarly 3,000 cars as compared with the week before that. Increases as compared with the corresponding week of last year were shown in all districts except the Pocahontas, in which there was a considerable decrease in coal loading, and in all classes of commodities except grain and grain products, livestock and coal. Loading of miscellaneous freight showed an increase of 46,465 cars and merchandise an increase of 40,639 cars, but coal loading showed a decrease of 10,394 cars. Coal loading, 165,359 cars, also was less than it had been in any previous week this year, while miscellaneous freight was higher than for any previous week this year. The summary, as compiled by the Car Service Division of the American Railway Association, follows:

REVENUE FREIGHT CAR LOADING

Week Ended Saturday, February 21, 1925

Districts	1925	1924	1923
Eastern	223,192	200,157	194,900
Allegheny	191,869	167,590	174,680
Pocahontas	40,919	42,647	31,393
Southern	147,583	140,341	138,906
Northwestern	116,540	113,889	108,055
Central Western	135,948	126,172	129,876
Southwestern	69,243	54,903	52,377
Total Western districts	321,732	294,964	290,308
Commodities			
Grain and grain products	41,042	44,048	40,344
Livestock	30,826	33,365	32,003
Coal	165,359	175,753	178,558
Coke	13,339	12,610	14,913
Forest products	83,030	77,824	69,762
Ore	11,009	8,513	9,597
Mdse., l. c. l.	253,777	213,138	201,726
Miscellaneous	326,913	280,448	283,284
Total	925,295	845,699	830,187
February 14	902,877	935,589	816,646
February 7	928,244	906,017	849,352
January 31	896,055	929,623	865,414
January 24	924,254	891,481	869,464
Cumulative total, eight weeks	7,207,409	6,981,575	6,735,564

The freight car surplus for the week of February 15-22 showed a large increase, to 256,230 cars, including 100,954 box cars and 113,302 coal cars. For the same period the Canadian roads had a surplus of 26,300 cars, including 22,525 box cars and 300 coal cars.

Car Loading in Canada

Revenue car loadings in Canada during the week ended February 21 aggregated 56,170 cars which was an increase over the previous week of 2,334 cars and over the same week last year of 9,072 cars. There was a severe snow storm in the Eastern division on February 20 and 21 last year which tied up traffic to a considerable extent for several days; also coal loading was affected last year by shut-downs in the Nova Scotia mines. In the Western division grain loading was lighter than last year by 387 cars, but merchandise showed a gain of 565 cars and miscellaneous freight a gain of 542 cars.

	Total for Canada			Cumulative totals to date	
Commodities	Feb. 21, 1925	Feb. 14, 1925	Feb. 23, 1924	1925	1924
Grain and grain products	7,238	6,973	7,388	51,119	66,102
Live stock	2,070	1,979	1,716	18,408	15,818
Coal	6,016	5,723	3,673	48,995	35,173
Coke	288	372	301	2,457	2,181
Lumber	3,294	3,123	3,306	21,967	22,061
Pulp wood	4,959	4,260	4,443	32,519	27,501
Pulp and paper	2,207	2,324	2,391	16,491	17,095
Other forest products	4,083	3,679	3,395	25,349	22,716
Ore	1,140	1,022	883	8,915	6,952
Merchandise, l. c. l.	14,247	14,368	10,627	106,346	94,337
Miscellaneous	10,628	10,013	8,975	75,656	77,051
Total cars loaded	56,170	53,836	47,098	408,222	386,987
Total cars received from connections	35,737	37,975	34,805	263,276	258,623

Tamping, Dragging and Rolling Consolidates New Fill

Louisville & Nashville embankments for Rigolets bridge approaches were constructed with unusual care to insure stability

By George G. Bryson

Resident Engineer, Louisville & Nashville, Rigolets, La.

THE construction of a new bridge across Rigolets Pass on the Gulf line of the Louisville & Nashville presented formidable problems because of the adverse foundation conditions of the site and the exposed position of the bridge with respect to the force of hurricanes which sweep the Gulf coast from time to time. This called for the development of a distinctive design of bridge substructure and required notably ingenious foundation methods, as described in an article by William H. Courtenay, chief engineer of the railroad, which appeared in the *Railway Age* of March 22, 1924, page 777. Of almost equal magnitude were the problems of constructing the embankment approaches for this bridge on unstable marsh land so that the situation not only presented the possibility of erosion during storms but the certainty of extensive subsidence. A careful study of the conditions imposed led to the development of methods for the placing, compacting and dressing of the fills which it is believed will be effective in eliminating much of the trouble which is frequently experienced with the sliding and settlement of embankments for long periods subsequent to construction.

Driving the Creosoted Pile Trestle Across Little Lake

Rigolets Pass is a connection between Lake Pontchartrain and Lake Bourne, an arm of the Gulf of Mexico bordered on its northerly side by low, flat land occupied for a considerable distance by the Mobile-New Orleans line of the Louisville & Nashville. Various considerations, primary among which was the necessity of avoiding interference between the construction work and the operation of trains over the existing structure, prompted the selection of a site for the new bridge some 150 ft. to the north of the old one. This offset, together with the need of developing easy grades to meet the rail level on the new bridge, which is five feet above that on the old one, and a desire to avoid any disturbance of the old embankment in the construction of the new, gave rise to the development of a new line for the bridge crossing for a distance of 14,600 ft. Of this total 3,095 ft. embraces the length of the new bridge, 3,576 ft. comprises creosoted pile and timber trestle construction in approaches at the two ends of the bridge and for a crossing of Little Lake, while the remaining distance, 7,929 ft., consists of embankments.

Except for the actual crossing of the Pass and for a distance of about 300 ft. at the west end of the location, the line traverses salt marsh land characteristic of that which the railroad occupies for a distance of about 30 miles along the shore of Lake Bourne. The general level of this marsh is only about 16 in. above the sea level and during severe storms is covered with from 8 to 10 ft. of water blown in from the gulf. The top three feet of the marsh comprises a crust consisting of dense masses of cane and marsh grass roots. Under this crust there is 12 to 15 ft. of mud and under this, sand mixed with soft clay is found to a depth of 18 to 20 ft. Compact sand is reached about 38 ft. below the surface.

A View of the East Approach Fill After Being Dragged

Embankments Were Built from Trestles

The material comprising this marsh is so soft that it was entirely impracticable to construct the tracks over its surface. For this reason the construction of the embankments for the new bridge approaches entailed the building of filling trestles 6,075 ft. long, of which 3,640 ft. is in the east approach and 2,435 ft. in the west approach. To insure adequate stability of these trestles, which were constructed with four-pile bents, it was deemed necessary to secure a penetration of 5 to 7 ft. in the compact sand formation. Therefore, the piles were required to have a total

penetration of about 45 ft. through the marsh formation.

Before undertaking the construction of the trestle, foundation tests were made to determine the character of the marsh formation by driving piles at uniform intervals along the old track, the information thus obtained serving as a criterion for determining the length of piles to be ordered for the various parts of the trestle. When delivered, the piles were unloaded along the old track and skidded to drivers working on the new line. Experience in driving proved that the piles ordered were of suitable lengths, the penetration for the last three to five blows of a 4,000-lb. hammer falling 30 to 40 ft. in the leads being only 1 to 1½ in.

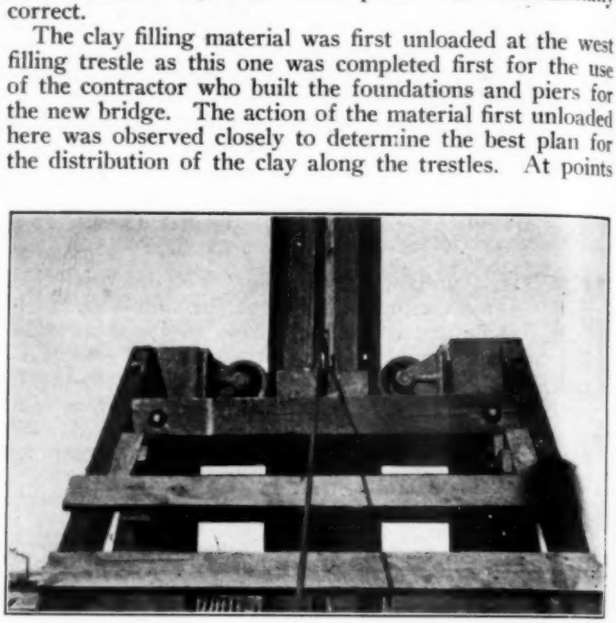
Use Clay for the Filling Material

Clay was selected for the filling material in order to avoid erosion of the embankment during tropical storms. This material was obtained at Lakeshore, Miss., 14 miles east of Rigolets, where it was excavated from pits and loaded on flat cars by a Model 37 Marion dragline excavator of the caterpillar type, using a 1½-yd. bucket and a 50-ft. boom. This machine excavated from 850 to 1,000 cu. yd. of material a day. The elevation of the original ground surface at the clay pit is about six feet above sea level. The pits were opened and excavated to a depth of 18 ft. or approximately 12 ft. below sea level. Water to a depth of four feet was kept in the pits while loading as the material, when thoroughly saturated, loads into and dumps from the drag line bucket more easily than if dry, and when placed on the cars wet unloads much better as the unloading plows lie flat on the floor of the cars and cut all the clay off without riding over the material as they would if the clay were dry. Water for submerging the bottom of the clay pit was obtained from an artesian well flowing at the rate of about 16,000 gal. per hour and was carried to the pit through a pipe line. This well also furnished steam water for the excavator outfit, camp supply and three locomotives used in this service. One engine made up the trains of loaded material and handled the empties for the excavator while the other two hauled the material in trains of 25 cars from the pits to the point of unloading.

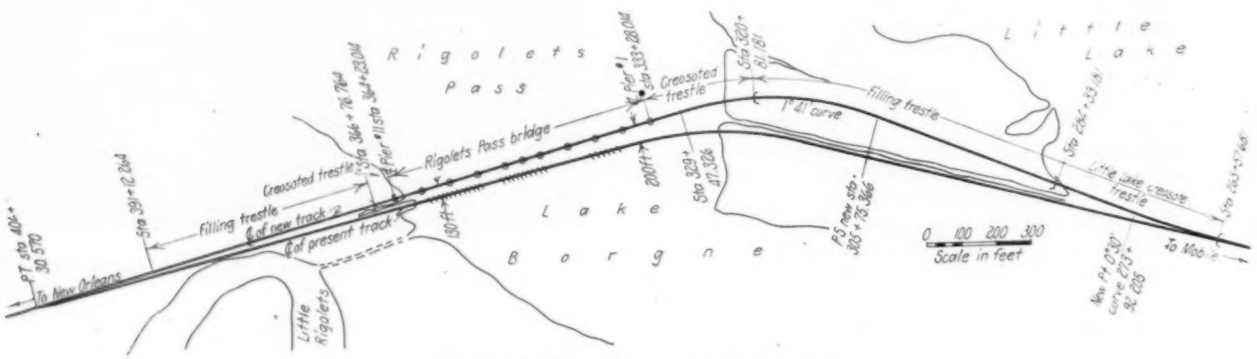
The 125 flat cars used in this service were equipped with stakes or guides for the unloading plows and with hinged steel aprons to provide an unbroken surface throughout the length of the train for the uninterrupted travel of the plows. The plows are Barnhart ballast unloaders manufactured by the Marion Steam Shovel Company and were moved over the train by an 80-hp. Lidgerwood unloader carried in the train next to the engine. One of the plows is right hand and the other left hand so that material can be deposited in uniform amounts along either side of the filling trestles as desired.

Investigation at the inception of this project led to the conclusion that the total amount of material required for the finished fills would be twice that determined by calculating the section between the marsh level and subgrade, or that subsidence would be 100 per cent. Observations to date indicate that this assumption was substantially correct.

The clay filling material was first unloaded at the west filling trestle as this one was completed first for the use of the contractor who built the foundations and piers for the new bridge. The action of the material first unloaded here was observed closely to determine the best plan for the distribution of the clay along the trestles. At points in the north slope in the west fill the new material had moved out 125 to 150 ft. from the center of the track, but on the south slope it has moved only to the foot of the old embankment which, no doubt, checked the spread on the south side of the new fill so that the marsh mud as displaced by the weight and bulk of the new fill, all shifted to the north, carrying with it sections of the marsh crust and the outer and lighter edges of the new fill. This has given certain sections of the new embankment the appearance of slides, such as are common on mountain slopes.



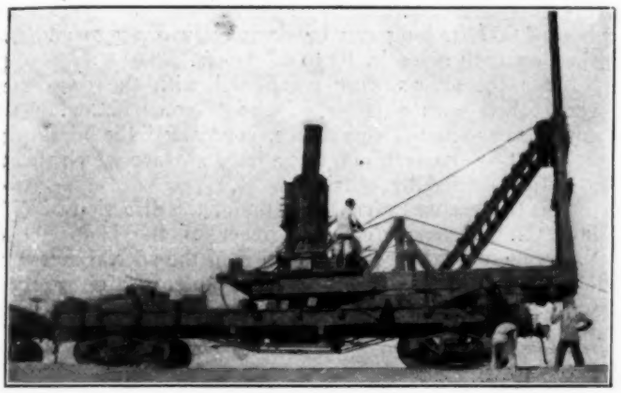
Two Flanged Wheels at the Tops of the Leads Serve as Guides for the Ram



General Location Plan at Rigolets Pass

Based on this experience with the west fill it was thought best to unload material from the trestles throughout their entire length and thus load the marsh crust slowly, causing the clay to break down and part the marsh crust at the trestle first and then penetrate and displace the mud, soft clay and sand and force this undesirable material outward and away from the base of the fill. This plan proved satisfactory. The crust was broken at the trestle, the inner edge bending downward under the

weight of the clay and buckling upward further out, allowing the soft mud to flow underneath it. This was followed by the spread of clay as its bulk was increased and it was thrown outward by the spreader. Continued loading moved the crust constantly outward and up and buckled more of the marsh surface upward so that after the fills had been completed the original marsh surface on both sides of the east fill had been pushed out an average distance of 100 ft. from the center of the track. The outer and lighter edges of the fill which fell on the marsh surface were carried out 40 to 50 ft. on this crust as it moved to the south as well as to the north, as the



A Side View of the Rammer After it Had Been Reconstructed to Allow Side Swinging

old embankment was too far away to check the spread of the east fill as was the case on the west side of Rigolets Pass. Consequently this fill had the appearance of having developed slides although not to as great an extent as the west fill. The uplifting of the marsh crust and portions of the mud underneath it caused this material to lose much of its water and become more stable and stiff, thus increasing its value as a counterweight against the parts of the clay embankment which may yet be suspended in the upper and softer formation of the marsh.

Trestle Deck Interferes with Filling

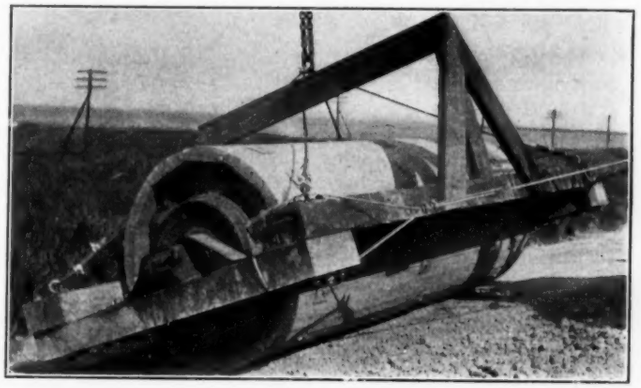
Because the material used for making the fills was wet and was unloaded over the side of cars, the space between the rails on the trestle could not be filled to the same level as the shoulders and caused a valley to be formed immediately under the track which filled with water. When the fill material unloaded from the work train had been carried to the level of the ties or slightly above, a Mann-McCann spreader was used to clear the track for the delivery of more material and also to extend the shoulders to a much greater width than was desired for the finished section. This surplus on the shoulders was moved by a locomotive crane with a ¾-yd. clam-shell bucket to the open space between the stringers, filling this space loosely and also heaping the clay slightly above the ties so that some of it could be driven down between the stringers by dragging or dropping the closed bucket on the clay.

This procedure had the disadvantage that it formed holes in the shoulders of the fill which filled with water and left the slopes of the embankment exposed to erosion. During the later part of the work a plan was devised for using the spreader to carry out this operation with the aid of a special bridge filling wing which was built for this purpose. The use of the spreader with this wing not only obviated the need of making any holes in the shoulders as were formed in the operation of the bucket but will do as much work in 20 minutes as the crane would do in 8 hours.

While the clam-shell bucket or the spreader could place any desired quantity of material between the rails neither of them was effective in working this material between the ties or in thoroughly filling the space under the trestle and in solidifying the material so placed. To overcome this deficiency a machine was devised by means of which the fill could be rammed between the ties of the trestle, both inside and outside the stringers. This machine has the general characteristics of a homemade skid pile driver and is mounted on a wooden-underframe flat car. The design was developed on the work, using such material as was available on the ground. Many of the parts are therefore heavier and more cumbersome than if timbers had been ordered specially and cut for this purpose.

The base of the machine consists of two 8-in. by 16-in. stringers 24 ft. long, placed along the two sides of the car with one end projecting 3½ ft. beyond one end of the car. A small one-drum hoisting engine was mounted on a platform placed at one end of these sills while pile driver leads 12½ ft. long were erected at the projecting end with the necessary bracing to secure stiffness in the transverse and longitudinal directions. At the top of the leads two double-flanged wheels mounted in cast-steel bearings were attached into the inner faces in such manner that the bearing surfaces of the two wheels were 26¼ in. apart.

These two wheels serve as guides for a plunger or ram consisting of an 8-in. by 16-in. timber 30 ft. long with a 33-ft. 80-lb. rail bolted to each 8-in. face. These rails were attached with their lower ends 3 ft. above the bottom of the sticks where they were made to bear on the tops of two blocks 8 in. by 13 in. by 3 ft., also bolted to the sides of the plunger or ram, thus giving the ram a base 8 in. wide by 42 in. long or the maximum dimensions that would permit it to pass between the ties and between the inner faces of the two inside stringers of the trestle. The face of this ram was shod with a steel plate ½ in. thick.



The Roller Was Provided with an Overhead Hitch for Moving It About

A triangular groove was cut in the center of the back side of the stick to serve as a guide for a hoisting cable fastened to the plunger 3 ft. from the bottom and carried up over a sheave at the top of the lead frame and thence to the drum of the hoisting engine.

How the Machine Was Operated

The machine was operated the same as an ordinary drop-hammer pile driver, raising the ram by engaging the friction clutch on the engine drum and delivering the blow by releasing the friction. The ram weighs 1,950 lb. Holes around the caps and piles and under the stringers were best filled when the clay was rammed wet as it then moves laterally. It is compacted best and becomes extremely hard when rammed dry. The consolidation of the clay between and along the outside of the stringers was carried along as the crane and bucket or the spreader

filled the space between the rails, the operation of filling and ramming being done alternately, until the opening directly under the track and between the ties was completely filled and rammed, this condition being indicated when the ram would not drive the clay lower than the bottom of the ties.

As it was found desirable to ram and consolidate the clay along the outside of the stringers as well as between them, the ramming machine was reconstructed, in part, to provide means for swinging the frame to either side. This was done by placing struts between the two sills, bolting them rigidly in this position and raising the entire frame and engine 12 in. The frame was supported in this position on a turntable 8 in. thick and 9 ft. in diameter, constructed of timber covered with ¼-in. steel plates salvaged from the dredging wells of the Rigolets bridge piers. The frame was pivoted over this table by means of a 6 in. pin passed through the table and the frame of the car and secured underneath the car sills.

A Close View of the Forward End of the Ramming Machine

The frame was swung to either side by means of one-inch lines fastened to the outer ends of outriggers projecting from the sides of the car near its forward end and passing through sheaves on the center line of the frame and thence to a winch head on the hoist. The car was moved forward or backward by using the winch head to haul on a 1½-in. manila line 150 ft. long which was caught over a track tie some distance forward or to the rear of the car by means of a timber hook. Water and coal were supplied from tanks and bunkers on a flat car coupled at the rear of the ramming machine.

The ramming machine will thoroughly compact the material at the center of the track and along both sides over a distance of 440 ft. in an eight hour working day, or under the center or along either side only for a distance of 1,320 ft.

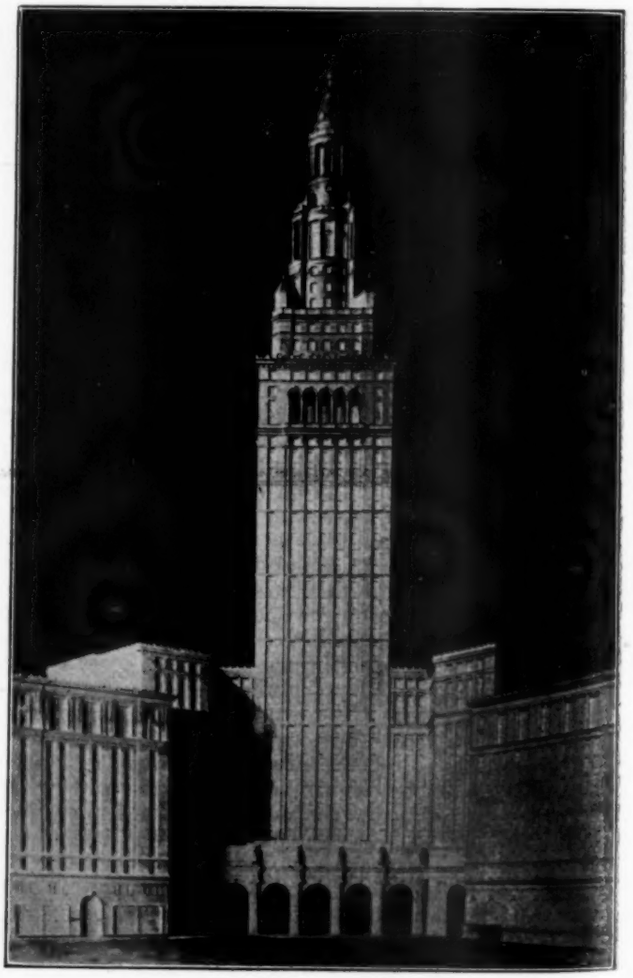
Slopes Were Dressed by Dragging and Rolling

Holes left in the shoulders of the fills by the crane and grab bucket and uneven points on the slopes were filled and removed by using a special drag outfit which also flattened the sides of the fills to a uniform slope of three to one. This drag was made by securing six, 33-ft. 80-lb. rails to a timber pile about 35 ft. long, the attachment being made by bolting the rails to the pile at each end and by lashing them at the center with a ¾-in. wire cable which was passed through a hole in the pile to prevent its slipping. This drag was hauled along the embankment by means of ¾-in. engine or car chains attached to it at the center and at each end and hooked to the rear of the tender and the forward end of the locomotive, the relative lengths of the chains being adjusted to secure the desired position of the drag on the slope, experience indicating what lengths and adjustments were necessary to secure the best results.

If the material is dry, as it should be to work best, and it has been uniformly placed along the shoulders and slopes, the engine may be moved at the rate of six miles per hour. If there are hard or high points in the slope, the drag must move very slowly, loading it heavier end over the high points by having track men ride on it. This is not at all dangerous. When desired, this drag is thrown from one side of the embankment to the other by making proper adjustments of the chains and moving it over with the locomotive. Reversing the direction of the drag is done by dropping the chains from the drawheads and reversing the connections. If conditions are good a fill about 4,000 ft. long can be completely dragged and finished on both sides in 10 to 12 hours.

After the slopes were completed with the drag they were rolled with a roller of simple construction. This rolling consolidated the slopes, compacted the loose material left by the drag and left a hard surface which should be little affected by erosion.

This project was carried out under the direction of William H. Courtenay, chief engineer of the Louisville & Nashville, who devised and instituted the special measures taken for consolidating the embankments after a thorough study of the conditions. The work was under the immediate direction of the writer.



Model of Cleveland Union Station

Traffic Growth Imposes Burden on the Chicago Terminals*

Through passenger and local freight stations must be maintained close to business center

By E. H. Lee
Vice-President and Chief Engineer, Chicago & Western Indiana, Chicago

RAILROAD transportation may be divided between freight traffic and passenger traffic, and between inbound and outbound business. Freight movements may be subdivided into through, local and those internal to the metropolitan area. Local and internal movements may be further subdivided between business to and from industry tracks, to and from freight houses and to and from team tracks. These last two are considered together in this paper because while one consists largely of less-than-carload freight and the other of carload freight, in each case the railroad has an added duty either in loading, unloading or protecting the freight, and the facilities, usually located close together, are handled by the same local organization.

A recent study of the freight transportation situation in Chicago, probably the most thorough and painstaking ever made, discloses the following statistics, using round figures:

AVERAGE DAILY MOVEMENTS, THROUGH AND LOCAL, TO CHICAGO

	Inbound		Outbound
Loads, Locals—			
Loads, Through	4,000		4,000
Freight house and team track	2,000	2,000	
Industries	6,000	3,000	5,000
	12,000		9,000
Empties	3,000		6,000
Total	15,000		15,000

MOVEMENTS, INTERNAL, TO CHICAGO

Loads (C. L.)	3,000	
Loads (L. C. L.)	1,000	4,000
Empties		5,000
Total		9,000

The movement of empty cars in the Chicago area is incidental. The movement of loaded cars is the vital factor in the situation. The varying movements of loaded cars in Chicago in the order of their relative importance are shown thus:

1. Loaded Local Car Movements to and from Industries:

	Cars	
Inbound	6,000	
Internal to Chicago	3,000	
Outbound	3,000	
Total		12,000 or 57 per cent

2. Loaded Local Car Movements to and from Freight House and Team Tracks:

Inbound	2,000	
Internal to Chicago	1,000	
Outbound	2,000	
Total		5,000 or 24 per cent

3. Loaded Through Car Movements Transferred Between Railroads:

Inbound	4,000	
Outbound	4,000	
Total	8,000	
	2	= 4,000 or 19 per cent
Grand Total		21,000 - 100 per cent

(Note:—These through transfer movements are counted twice, once inbound and once outbound. In order to determine their relative importance they should be counted only once, and therefore the total is divided by two.)

* Abstracted from a paper presented at the fourth mid-winter convocation of the Western Society of Engineers on February 20.

The larger industrial plants locate where steam railroad industry track connections are available. New plants locate where land is relatively cheap and track access easy. Old and established plants as they grow are constantly removing from the old locations where plant space is restricted and tracks have become congested, to new areas where ample space is available both for plants and trackage. It is therefore apparent that this element of the freight traffic of Chicago will be handled successfully along the same general lines of growth and development as in the past.

Freight Houses and Team Tracks

The freight houses and team tracks of the various railroads entering Chicago are still located in general on their original sites, but changes have come and will persist. The motor truck is playing an increasingly important part in the handling of freight between the store or factory and the freight house and team track. It is also diverting entirely from the steam roads a considerable tonnage of freight traffic destined to nearby points. The use of the motor truck makes possible so-called off-track freight houses, while universal freight houses, where freight is received mixed for all railroads to be there classified and loaded into trap cars for delivery to the freight house of each of the road-haul roads, have been growing in number in Chicago.

Transfer stations located in the outskirts supplementing the work of the downtown freight houses are being increasingly used by the road-haul roads in Chicago. Other improved facilities and methods of freight handling may develop in the future.

These changes illustrate the fundamental fact that freight traffic destined to and from freight houses and team tracks differ radically in one characteristic from local freight traffic destined to industries. When congestion comes the industries themselves move to a new and freer site. In the case of freight house and team track traffic, however, past experience indicates that they tend to move to the freight producing area. This difference will have an important influence upon the future development of freight house and team track traffic in Chicago.

Those railroads which have already rebuilt their local freight house and team track facilities have followed the theory that business in and near the "Loop" will continue to increase and that therefore they were justified in providing a substantial increase in these facilities for the future. In any event it seems certain that as the city grows and new centers of freight house and team track tonnage develop, suitable facilities of one kind or another to care for this traffic will be provided near the source of the traffic, thereby relieving the down-town freight houses and team tracks.

In the early days through cars from points outside of Chicago destined to points beyond were interchanged directly between the road-haul roads. With the growth

of freight transportation the tendency has been more and more to handle this business over belt lines, where the traffic could be moved free from the congestion of the down-town tracks and city streets. At present, traffic of this kind comprises 19 per cent of the total loaded car movements within the metropolitan area, and 75 per cent of this 19 per cent is handled by belt railroads.

The existing belt lines with such additions to permanent way, power and equipment as may reasonably be required by the growth of traffic will be able to handle this through transfer traffic promptly and economically both from an operating and a capital expenditure point of view for many years to come. It is to be noted that these through movements are no longer any real part of the freight transportation problem of Chicago. They are already largely removed therefrom and constantly tend to become of less relative importance.

Passenger Traffic of Two Classes

Passenger transportation on the steam railroads of Chicago is divided between through traffic and suburban traffic. More than 500 through passenger trains and more than 800 suburban trains per day enter and leave the city. Suburban trains were originally put on by the railroads to fill a pressing public need and to utilize tracks and facilities then only partially used. Without doubt suburban transportation on the Chicago railroads should continue as at present until this traffic begins to congest and crowd out the through traffic. As between the two, however, through traffic must be given the preference, because suburban and interurban passenger traffic can always be diverted to other transportation routes, whereas no such possibility of diversion exists for the through passenger traffic of the steam railroads.

One strongly marked characteristic appears in the great passenger stations of the country. With few exceptions they tend to remain close to the business centers of their respective cities. They may move closer in, but seldom move farther out, the reason being that the business center is the point most easily reached by the greatest number of people. Proximity thereto seems to be the best measure of convenience. The location of the through passenger terminal is therefore less subject to change than the railroad terminal of any other kind.

The struggle for profit is the main incentive leading to improvements in facilities and methods for the railroads, as for other forms of business and industrial activity.

And profit involves the keeping of expenditures to the lowest practicable terms, upon an economic basis. The railroads west of the Chicago river have completed the reconstruction of their passenger terminals, and with one exception their freight houses and team tracks. The railroads on the lake front have covered their similar situation by acquiring real estate and accepting ordinances, thus settling upon their reconstruction program. This leaves only the 14 railroads, included in the three groups known as the B. & O., LaSalle and Dearborn Station groups, still to formulate plans for the reconstruction of their freight and passenger terminals.

Several reports on the Chicago terminal situation have been made in recent years. The most important of these is that made in 1915 by John F. Wallace, chairman, Chicago Railway Terminal Commission. It recommended the straightening of the Chicago river, something well night indispensable to the future of the city: it recommended that all streets over the area occupied by the 14 railroads be carried up on viaducts, the ground level under which was to be occupied by rearranged railroad tracks and facilities: and it recommended the use of the air rights over tracks for the development of business structures of various kinds, as has been done in the case of the Grand Central terminal in New York.

Shift to Lake Front Unsound

These recommendations deserve unstinted praise. They are to the equal advantage of the public and the railroads. However, the report falls into the fundamental error of urging the removal of passenger terminal facilities to the lake front, and the sale of all railroad property each of Clark street to private interests. The whole transaction, i.e., the sale of property and the cash value of air rights, less the cost of river straightening, viaducts, and railroad improvements, was estimated to show a profit of $43,000,000.

Business property is valuable in proportion to the number of people coming to or passing by it. Passenger station improvements attract people and freight yards and stations drive them away. For this and other good reasons the assumed value of railroad property to be sold and air rights to be leased have been found upon careful analysis to be more than twice too high, and the estimated cost of improvements using present unit prices is only one-half large enough; so that the alleged profit of $43,000,000 becomes an outgo of more than that amount, an error in this estimate of financial results of $90,000,000. Furthermore, a feature of this report, apparently made upon assumptions unchecked by a careful scrutiny of the available facts, is the recommendation that passenger facilities be removed from a site already owned by the railroads and fully ample for the purpose, as detailed plans have shown, to another site twice as far from the business center, and much less accessible to passengers. Such a plan would mean a serious financial loss to the 14 railroads. It would be of manifest disadvantage and loss to the public because it would greatly delay if not entirely stop business development to the south of the Loop. Pedestrians and patrons of urban transportation systems would be greatly inconvenienced, and patrons traveling by taxi and motor, except those coming from a narrow fringe along the lake shore to the north and south, would lose both time and money.

Unification Not Desirable

A second report, the so-called Warfield Report on Joint Terminals at Chicago, made under private auspices and issued March 28, 1922, is an example of a meager development of information, with the erroneous conclusions thereby entailed. As to passenger traffic, the Wallace report was assumed to be correct and its conclusions were adopted without investigation. As to freight traffic, the Warfield report recommended the expenditure of over $50,000,000 for improvements to handle Chicago's freight traffic. The report evidently assumes that through transfers make up the bulk of the total movement, whereas this movement is only 19 per cent of the whole, three-quarters of which is now being handled promptly and economically over some one of the various belt lines. The remainder can be equally well so handled both now and in the future, and therefore the expenditure of most of this great sum is recommended to meet a need that does not exist.

Conclusions

This report also recommends the unification of all Chicago railroad terminals, a plan under which the separate operation and control of the road-haul roads would cease at the line of the Elgin, Joliet & Eastern. Such a radical change in operation would be undesirable alike to public and private interests, because it is contrary to the entire trend of growth of the railroads in Chicago.

Summarizing the Chicago Terminal situation, the

probabilities seem to be: That congestion will continue to appear from time to time, because of the growth of population and business; and congestion is about the only evidence of the need of enlarged facilities that is considered valid and conclusive by either railroad managements or public regulating bodies;

That local freight traffic to industries will generally find relief from congestion by the removal of the industries themselves to new locations, free from the old restrictions;

That freight house and team track traffic will tend to find relief from congestion, by the development of new units of the various required kinds, located adjacent to new freight producing areas, and supplementing the old facilities;

That through transfer freight traffic will continue to move over existing belt lines in greater volume, using tracks and improvements which will be enlarged as becomes necessary.

That suburban passenger traffic will continue as at present until it congests and limits through traffic, probably then to be diverted to other available routes of urban transportation;

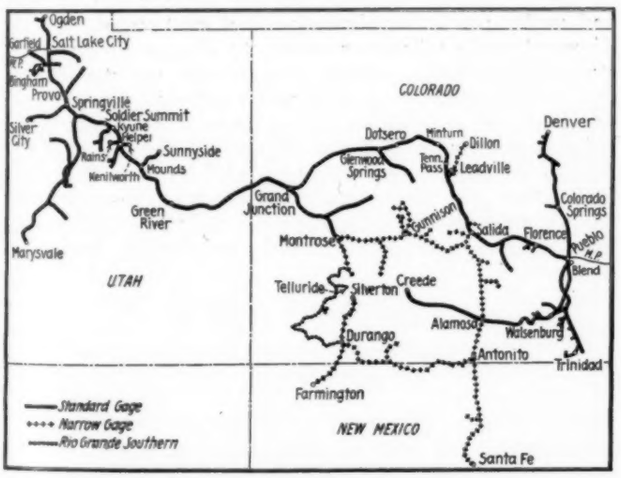
That through passenger traffic will continue to increase and to enter terminals that cling to the heart of the city; that these terminals are more nearly fixed and immovable than any other kind of railroad terminal improvements; and that consequently, unless future requirements have been wisely foreseen and provided for in present plans, the means then used to meet the later growth of this traffic either by the enlargement of the terminals or by the development of other alternatives will cost enormously more than railroad improvements of any other kind.

The railroads are the foundation and industry is the superstructure of the business activity of the city, as of the nation. Each depends upon the other for continued life and prosperity. Their interests are intrinsically identical and cannot be separated without mutual disaster.

D. & R. G. W. in Transition Period

Joint control by Missouri Pacific and Western Pacific unites property with aggressive interests

IT is to be hoped that the Denver & Rio Grande Western's involved problems are now far enough advanced towards solution so that the management will in the future be able to pay more attention to railroading and less to worries of finance and litigation. The promising phases of the situation outweigh the few remaining discouraging factors. The control or ownership of the property seems to have been determined,



The Denver & Rio Grande Western

divided as it now is equally between the Western Pacific and Missouri Pacific; this creates a community of interest among the three properties. The interest of the rejuvenated Missouri Pacific in the property restores the Denver (D. & R. G. W.) in great measure, at least, to the new Missouri Pacific group, thereby uniting it with strong and aggressive interests. Not the least promising factor in the Denver situation is the selection to its presidency of J. S. Pyeatt, who comes to the road after his signal success as the executive of the Gulf Coast Lines.

Brief History of Denver's Troubles

The history of the Denver's troubles during the past decade constitute an involved story. It deals almost entirely with the relations between the Denver & Rio Grande Western and the Western Pacific. The Denver was formerly a prosperous property with a good dividend record and good credit. It was acquired by the Gould interests in 1901, through the purchase of stock by the Goulds and the Gould-controlled Missouri Pacific. It was thereupon made the means of carrying out the Gould ambitions for a through line to the Pacific coast in the form of the construction of the Western Pacific, assisted by the financial backing and guarantees of the Denver. More precisely, the Denver guaranteed an issue of $50,000,000 first mortgage bonds of the Western Pacific, which were sold to the public. It made advances to it totaling $25,000,000, which the Western Pacific paid for in second mortgage bonds, and some $17,500,000 was advanced on notes, these advances with interest finally totaling $55,500,000. The Denver also held $50,000,000 of the Western Pacific $75,000,000 capital stock.

The Western Pacific started operation in the fiscal year ended June 30, 1912, and from the start failed to earn the $2,500,000 required for interest on its first mortgage bonds. Sums needed to make up that interest were advanced by the Denver under its guaranty, and the then parent company took over notes from the subsidiary company in payment. This continued until 1915, when the Denver refused further to advance the first mortgage interest; in other words, it defaulted on its guaranty. The first result was to throw the Western Pacific into receivership. It was promptly reorganized in 1916 by interests owning the first mortgage bonds, and in the reorganization the interest of the Denver was entirely eliminated. The new company, assisted largely by the traffic given to it by the war-time cessation of Panama Canal competition, prospered and has since earned sufficient after charges to pay regular dividends on its preferred stock. The new Western Pacific Corporation, furthermore, secured control of some 95 per cent of the

first mortgage bonds. Its aggressive owners set out to sue the Denver for damages on the failure of the Denver to meet its guaranty. They won such damages in the amount of $38,000,000, as a result of which the Denver itself went into receivership.

First Reorganization Fails

The first receivership of the Denver & Rio Grande (in the present cycle) began in January, 1918. Reorganization in the interest of the new Western Pacific Corporation, which bid in the property to protect the judgment won by the first mortgage bondholders, was effected in 1921. By the reorganization plan, the Western Pacific gained entire control of the Denver through the ownership of 300,000 shares of Denver no par value stock. The preferred and common stock of the old company, amounting in total to about $80,000,000 par value, was not taken care of in the reorganization. These issues were entirely eliminated and with them the interest of the former owners, including notably the Missouri Pacific and those who had acquired the former Gould holdings. The new company was named the Denver & Rio Grande Western. It was not successful and remained out of receivership only from August 1, 1921, to July 21, 1922, when a default in bond interest again put the property in the hands of the court. Another reorganization plan was offered in 1922, but it was not until 1923 that the plan was offered that, as later amended in 1924, permitted a second reorganization.

D. & R. G. W. Revenues and Expenses

	1924	1923
Total operating revenues	$33,011,558	$34,587,497
Maintenance of way	6,128,433	5,534,640
Maintenance of equipment	9,151,008	9,653,292
Transportation	11,378,447	12,698,471
Total operating expenses	28,591,457	30,030,670
Net operating revenues	4,420,101	4,556,827
Net operating income	2,785,083	3,231,815

The reorganization plan which has lately gone into effect called for the issuance of 300,000 shares of no par value common stock to be taken over by the Western Pacific Corporation for $10,000,000 in cash, and for the sale of one-half this issue to the Missouri Pacific, which agreed to pay the Western Pacific $9,000,000 for it. It is thus that the interest of the Missouri Pacific in the Denver has been restored. There were issued $16,445,600 of 6 per cent cumulative stock without voting power, and $29,808,000 general mortgage sinking fund bonds paying 5 per cent interest and maturing in 1955, these two issues being given in exchange for the refunding bonds and adjustment bonds, default of interest on which had caused the failure of the first reorganization. Underlying bonds totaling $81,112,000 were left unmolested, as were some 4½ million of equipment trusts.

Last November, as contemplated in the plan, there were sold to the Missouri-Pacific and Western Pacific $3,000,000 6 per cent refunding and improvement mortgage bonds, the proceeds to be applied to rehabilitation.

The new general mortgage sinking fund bonds are of particular note. The amount of the sinking fund is 1 per cent annually. Payments for the sunking fund are to be from earnings but the charge is cumulative. The bond interest, for the present, is cumulative. Even if the interest is earned, its payment is not mandatory. After February 1, 1929, however, this interest becomes a fixed charge.

Fixed Charges on New Basis Would Not Have Been Earned in 1924

The fixed charges of the Denver under this somewhat unusual arrangement are, at present, quite low. They include only the interest on the $81,112,000 underlying bonds which totals $3,379,740 annually, about $200,000 interest on the equipment trusts and $180,000 on the refunding and improvement mortgage funds. This makes a total roughly of about $3,800,000. The disconcerting feature of the situation is that the net railway operating income of the Denver in 1924 was only $2,785,083, or about $1,000,000 short of meeting fixed charges on the new basis. The Interstate Commerce Commission approved the reorganization plan with due cognizance of the Denver's recent lack of earning power. Final approval was given in June, 1924, and figures for the year 1923 then available showed net operating income for that year of but $3,231,815, or only slightly more than in 1924. Its approval was grounded on the fact largely that the Denver had, in earlier years, shown a considerably better net than would have been sufficient to meet the fixed charges of the new plan. The following figures of net operating income show the situation clearly:

Standard return*	$8,319,377	1921	$3,534,496
1918	5,492,884	1922	5,558,452
1919	6,113,737	1923	3,231,815
1920	6,348,452	1924	2,785,083

*Average annual net operating income for the three years ended June 30, 1917.

However, under the new plan, it was provided that the dividends of the Utah Fuel Company should accrue to the Denver until at some future time the Denver should be able itself to earn the interest on the general mortgage bonds and preferred stock after which the dividends are to accrue equally to the Western Pacific and Missouri Pacific. The Utah Fuel Company is a prosperous property and in the past has had earnings annually approximating three-quarters of a million dollars.

In the tabulation of net railway operating income, it will be noted that there are three years considerably below the average for the rest, namely 1921, 1923 and 1924. The year 1921 was the year of the Pueblo flood. The low figures for 1923 and 1924 seem best to be explained by the rehabilitation work that the Denver has recently had under way, a fairly substantial portion of the cost of which it has been necessary to charge to operating expenses. This is notably true of the maintenance of equipment expenses of 1923 when deferred work resulting from the 1922 shopmen's strike was being caught up. Of course, it is realized that this is not the sole explanation of the low net in 1923 and 1924, because it is very likely that the Denver in recent years has not been handling the traffic which more recent better management should assist it to secure—particularly traffic from connections.

Rehabilitation Program

It is generally recognized that from about 1917 the Denver & Rio Grande has been in a bad way generally. Maintenance was deferred, particularly it is understood on the less accessible branch lines, and there was an almost entire lack of a capital expenditure program. These things are a matter of record in such places, for instance, as in the report made to the court in 1923 by B. B. Greer, operating vice-president of the Chicago, Milwaukee & St. Paul, who particularly pointed out the lack of proper maintenance, the need for more adequate shops and the desirability of much cut and embankment widening. A striking picture is also to be secured in the annual tabulations of expenditures for additions and betterments. The property investment account of the Denver (totaling $182,606,796) as of December 31, 1922, was only $10,243,245 greater than as of June 30, 1914, representing an average annual increase of but $1,204,000 in the 8½ year period.

A substantial change in the situation began in 1923, because in that year additions and betterments were made to the amount of no less than $9,028,751. The program instigated at that time was the result of suggestions made in 1922 by the receiver, J. H. Young, who recommended capital expenditures of some $24,000,000 and by Mr. Greer who raised this total to $30,000,000. The work to date has included, notably, large acquisitions of equipment, there having been acquired in 1923 no less than 50 locomotives and 1,460 freight cars. The Denver, incidentally, reports a credit per diem balance, but this may be chiefly due to the fact that it receives a minimum proportion of its business from connections, or, in other words, engages in a minimum of bridge line traffic.

In its rehabilitation program the Denver has paid particular attention to shop facilities. It had a $3,000,000 program for this work which is now about completed. This program included four new shops, and additions to others. The new Burnham locomotive shop at Denver has a capacity of 12 general repairs monthly, that at Salt Lake City, the same; a new shop at Salida, 6, including work on narrow gage locomotives, and the new shop at Grand Junction capacity for 4 or 5. The capacity of the shop at Alamosa was increased to 10. In addition to this work, a new 18-stall roundhouse was built at Salt Lake City, 8 stalls were added at Salida and 6 at Alamosa.

In 1924 the budget called for the laying of 10,000 lb. of 90-lb. rail. About 85 per cent of the main line from Denver to Salt Lake City is laid with rail of this weight. The main line is tie-plated throughout. Gravel or lead slag is used for ballast. Mr. Greer had little complaint concerning the condition of ties or rail but it was his belief that there was much to be done in the way of ballasting.

Traffic Areas

The Denver & Rio Grande Western operates 2,610 miles of railroad, 1,779 miles of which is standard gage and 731 narrow gage. The main line extends from Denver, south to Pueblo, thence west through the Royal Gorge of the Arkansas river, over Marshall Pass at an elevation of 10,200 ft., thence down the valleys of the Eagle and Grand rivers and across the eastern half of Utah to Great Salt Lake. At Marshall Pass this line crosses the Continental Divide of the Rockies and at Soldier Summit the Wahsatch Range of Utah. Standard gage branches extend southward to Walsenburg and Trinidad, west from Walsenburg to Creede, etc., and there is a considerable mileage of standard gage branches to the east and south of Salt Lake City. The narrow gage mileage serves the extended area of southern and southwestern Colorado and includes one line south to Santa Fe, N. Mex. Most of it is presumably operated at a loss or with only small profit but several of the narrow gage branches reach profitable mining centers and are valuable feeders.

The Denver originates the greater part of its traffic which is anything but diversified. The tonnage in 1923, the latest year for which published figures are at present available, was divided: 8.8 per cent products of agriculture; 2.6 per cent products of animals; 72.6 per cent products of mines; 3 per cent products of forests and 11.6 per cent products of manufactures. In 1923 the Denver had an average haul of 168 miles and its average receipts per ton-mile were 1.48 cents. Its traffic in 1923 was less than in 1916, 1917, 1918 or in 1920. Coal, the largest unit under products of mines, constituted in 1923, 48.4 per cent the total revenue tonnage, and the next largest grouping was "other ores and concentrates" which constituted 9.5 per cent. The Denver & Rio Grande was built principally to reach the mineral area of Colorado and the struggle between the Denver and the Santa Fe to reach the then prosperous Leadville district by way of the only available route through the narrow Royal Gorge, is one of the high lights of American railway history. These mineral districts, supplying in particular lead, silver and gold, were several in number. The Creede and Silverton districts have died out. There are still extensive operations at Telluride, Durango, Leadville and Blende.

Coal

The Denver & Rio Grande serves several coal districts. At the eastern end of the line are the Trinidad, Walsenburg, Florence and Crested Butte districts and at the western end the extensive operations on the eastern slope of the Wahsatch range. The Trinidad field gives most of its supply to the Colorado & Southern. The Walsenburg field divides its tonnage between the Colorado & Southern and the Denver, coal for Texas moving over the former and both dividing the heavy tonnage destined for the steel mills at Pueblo and to points north and east. The Florence field (west of Pueblo) is served at Chandler and Fremont by Denver & Rio Grande Western branches. The Crested Butte field is served by the narrow gage line extending south from Salida; the coal brought in by narrow gage cars is dumped there by a recently installed car dumper into the standard gage equipment.

The coal which is mined in the Wahsatch region centers on Soldier Summit and most of it moves west to the smelters at Midvale, Murray, Garfield and elsewhere in the Salt Lake Valley. Enough of it is turned over to the Western Pacific so that for all but three months of the year that carrier is the only trans-continental road on which westbound traffic predominates. The amount of coal moving from the mines at Sunnyside, Kenilworth, Helper, Rains, etc., is of such volume that 85 per cent of the traffic westbound up to Soldier Summit is coal and the westbound revenue tonnage is four times the eastbound.

DENVER & RIO GRANDE WESTERN—COMPARISON OF SELECTED OPERATING STATISTICS, 1920 TO 1924

Unit	1920	1921	1922	1923	1924 11 mos.
Average mileage operated	2,585	2,592	2,593	2,593	2,603
Net ton-miles millions	2,226	1,524	1,801	1,931	1,820
Car miles per day	20.0	14.2	16.1	17.2	17.1
Net tons per loaded car	29.4	27.5	28.3	27.8	27.2
Per cent loaded to total car-miles	68.4	64.9	66.9	68.2	69.0
Net ton-miles per car day	402	254	305	326	322
Freight cars per train	31.2	33.1	32.9	31.7	36.0
Gross tons per train	1,216	1,232	1,267	1,225	1,388
Net tons per train	608	574	604	582	656
Train speed-miles per train hour	9.0	9.4	9.3	9.5	10.1
Net ton-miles per train hour	5,487	5,406	5,612	5,554	6,597
Lb. coal per 1,000 gross ton miles	282	271-227*	229	247	216
Locomotive miles per locomotive day	48.7	35.0	37.0	40.9	37.4
Per cent frt. locos. unserviceable	27.0	25.3	27.9	29.7	21.8
Per cent freight cars unserviceable	5.7	9.2	10.9	6.9	6.2

*Corrected figure.

The Denver serves in western Colorado the so-called western slope district, a prosperous fruit and vegetable country, much of it under irrigation, lying between Montrose and Grand Junction. The products of this area include apples, peaches, pears, head lettuce, potatoes, celery, etc. All of it is refrigerator traffic, and during the season some 16,000 cars move eastbound to Denver and beyond. Between Grand Junction and Helper is an area which originates little traffic. Here the Denver is a bridge line only.

Grades

The Denver's mileage between Denver and Salt Lake City totals 745 and in this distance it crosses two moun-

tain ranges, in the one case reaching at Tennessee Pass the highest point reached by any transcontinental route. The grade from Pueblo up to Tennessee Pass is 1.42 per cent opposed to westbound traffic. From Tennessee Pass the line descends on a 3.3 per cent grade to Red Cliff, but a second track allows an ascending grade eastbound of 3 per cent. There is a descending line from Red Cliff to Green River, Utah, which gives grades opposed to eastbound traffic of 1 per cent from Green River to Glenwood and of 1.42 per cent from Glenwood to Minturn. At Green River the ascent of the Wahsatch range begins. There is a 1.1 per cent ascending grade to Helper, thence a 2.4 per cent grade to Kyune and finally 1 per cent to the top at Soldier Summit whence a 2 per cent descending grade carries the line down into Great Salt Lake basin. Formerly the last mentioned was a 4 per cent grade, but this was remedied by an elaborate realinement project completed in 1913. Helper service is required eastbound up to Tennessee Pass and both eastbound and westbound up to Soldier Summit.

Through Traffic Needed

The Denver now has in service 30 Mountain type locomotives of 67,000 lb. tractive force, or of 78,000 lb. with the booster. It has 10 of the Santa Fe type of 81,200 lb. tractive force as well as 34 Mallet locomotives of three classes having 62,000, 95,000 and 157,000 lb. tractive force respectively. It has been noted that 50 new locomotives were acquired in 1923. At the end of the year the road owned a total of 578 locomotives averaging 36,493 lb. tractive force, including both standard gage and narrow gage power. One feature of operation of particular interest is the fact that passenger locomotives are regularly run through on the heavy passenger trains from Denver to Grand Junction, 449 miles, and from Grand Junction to Salt Lake City, 335 miles, the remarkable feature being that these runs are made with coal burning locomotives.

What the Denver is held to need more than anything else is more through or bridge carrier business. It is handicapped in getting this today presumably more than anything else by the pure excellence of the competing Union Pacific service and operation. It was noted in a recent article on the Western Pacific in these pages that 85 per cent of that carrier's perishable freight, in spite of the community of interest between the Denver and Western Pacific, is turned over to the Union Pacific. The situation with reference to through business is expected to be remedied greatly by the Moffat tunnel which will be made available to the Denver, it is hoped, by the construction of the cut-off between Dotsero, Colo., and Orested by the Denver & Salt Lake Western. At present, the Denver & Rio Grande Western mileage between Denver and Salt Lake City is 745 miles, whereas the Union Pacific mileage, with much better grade conditions, is about 682. The tunnel will allow the Denver to reduce its mileage by 175, thereby bringing it down to 570. A flaw in this argument is that the Missouri Pacific connects with the D. & R. G. W. at Pueblo and not at Denver.

Admitting the possibilities of the Moffat tunnel connection, one wonders, nevertheless, if future Denver possibilities do not depend more than anything else on high grade managerial efficiency and on what we may term, for want of a better name, merchandising skill. It does not seem right to judge the Denver & Rio Grande on its results for the past two years. The property is in a period of transition, and one cannot deny that, as pointed out in the first paragraph, the optimistic features outweigh all others.

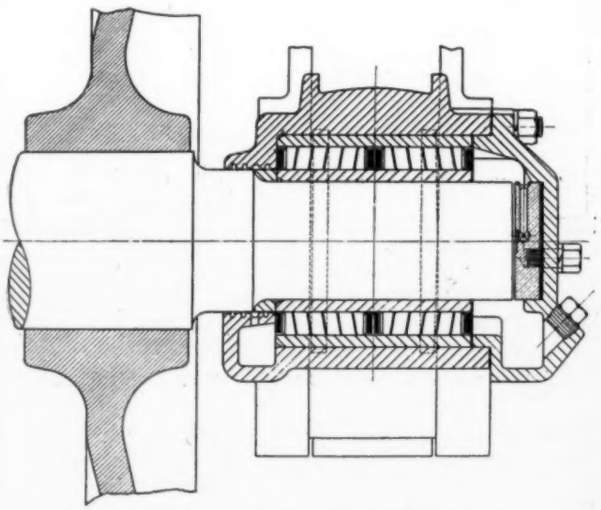
Efficiency Class of Central of Georgia Employees at Columbus, Ga.

Northern Pacific Car Is Motorized

Oneida power units installed in standard railway car—Many details of early design improved

Northern Pacific Passenger-Baggage Car with Trailer Attached

IN the fall of 1923 a standard 36-ton railway coach of the Chicago & North Western was provided with two gasoline motor driving units, made by the Oneida Manufacturing Company, Green Bay, Wis., and installed as described on page 585 of the September 29, 1923,



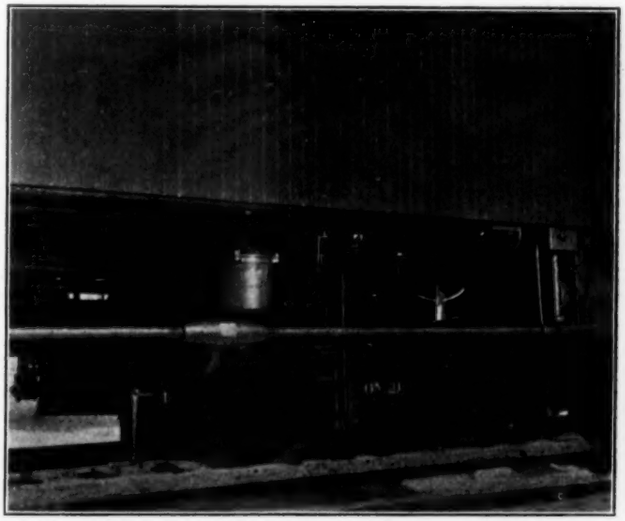
Cross Section of Roller Journal Bearing

Railway Age. Since that time several cars have been equipped with these power units for different roads, the latest being the Northern Pacific combination passenger and baggage car shown in the photograph. While in general there has been no change in the motor equipment and control over that applied in the original car, a number of important details have been altered and improved, based on the experience with the cars in practical service during the past two years.

The Oneida equipment consists of duplicate gasoline motors of 70 hp. or 104 hp. located under the body of the car and driving through suitable mechanical connections, one to the inside axle of each truck. Either single or double-end electro-pneumatic control of the motors is provided and when conditions of load and grade are right, after both driving motors have been used to get the car up to speed, one may then be cut out. This arrangement tends to promote economical operation and also gives added reliability of service since in the event of trouble with one of the motors, the other can be used to bring the car in under reduced speed.

In the more recent cars provided with Oneida power units the motor equipment has been increased in size and in sturdiness. Originally it carried a 2⅜-in. crank shaft supported by four main bearings, whereas now it carries a 3-in. crank shaft supported by seven main bearings. Roller bearings have been provided for the car journals, which are found to decrease the power required for starting and at speeds up to 20 miles an hour. They are said not to be essential, however, as successful installations have been made both with the plain and with roller type journal bearings.

The oiling system has been improved, the present equipment carrying an oil filter which filters the oil in the crank case every 32 miles, thus eliminating the necessity of draining the crank cases so frequently. It also carries a drilled connecting rod for the lubrication of the piston pin and bushing. The water pump sizes have been increased. The equipment now carries dual ignition, each system being entirely separate from the other. The clutch sizes have been increased to take care of the additional power as well as other power transmission parts.



View of One of the Oneida Power Units Under the Car

The radiator is now located in the motor cradle and is of a sectional type which permits ready removal for maintenance purposes. This radiator is equipped with winterfronts, automatically controlled, for northern territories. The entire power plant is complete within a cradle and is secured to the under side of the car by four 1¼-in. pins, an arrangement which permits ready removal and

replacement. Each power plant is self-contained and may be operated from under the car for test purposes as well as from the operator's station. The other connections to the equipment consist of two air lines and a fuel line. These are equipped with flexible connections and unions for their quick removal. There is also a three-wire cable which carries quickly detachable terminals.

The advantage of the unit assembly in a cradle is considerable. Where a number of cars are running out of one terminal, an extra power unit may be carried and with this extra unit the cars can be kept in almost constant service. The work of interchanging units requires about one hour. The next important change is the elimination of a small auxiliary power plant which furnished 1,500 watts of 110-volt current for the operation of air compressor, lights, etc. By the present method, each motor carries a 6-ft. Westinghouse compressor, direct driven. Each unit also carries a 600-watt, 32-volt generator, also a 100-amp.-hr., 32-volt battery. The change in the above equipment makes each unit entirely independent of the other whereas in the original equipment there was only one source of current and air supply.

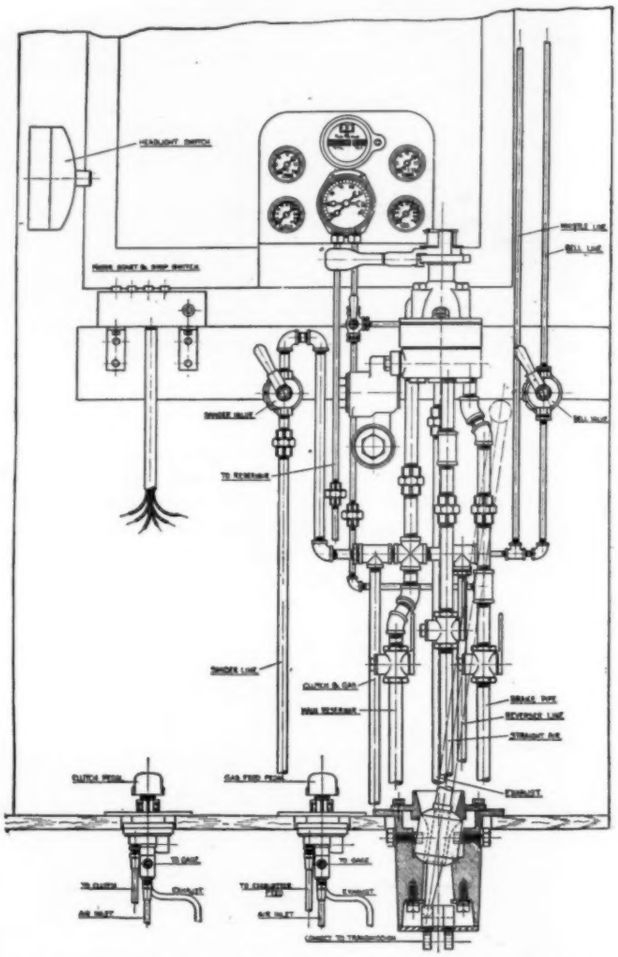
In the air reservoir system provision has also been made for two reservoirs. The air first enters one of small size; when the pressure in this tank reaches 80 lb., it by-passes into the second tank. Surplus air therefore charges the second tank and when the pressure in both are equal, it feeds from both of them. This permits the quick charging of the tanks for starting purposes.

Manual shift is now used in about 80 per cent of the equipment in place of the pneumatic shift in the transmission gears. It makes a somewhat cheaper installation and is more simple. The pneumatic control of the motor speeds and clutch application is still retained.

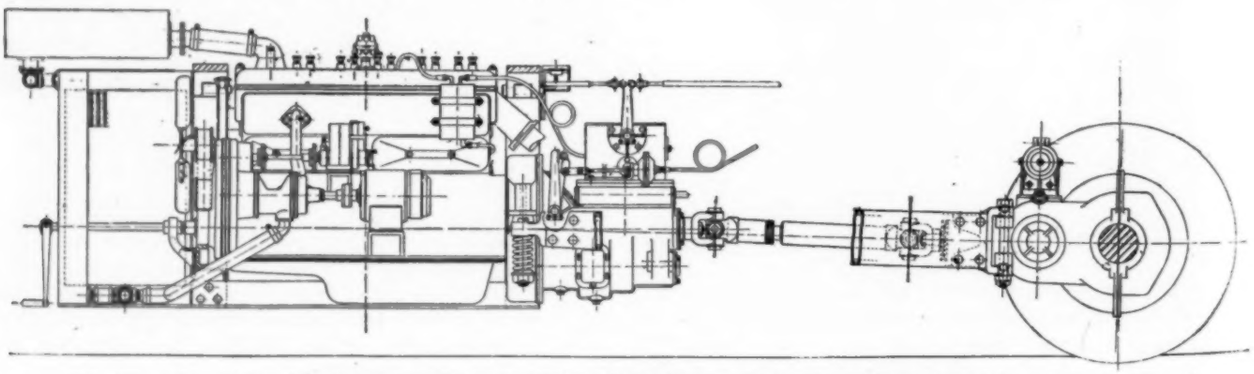
The controlling devices are practically the same except for a few details. The operation of the individual motors is closely indicated through gages at the operator's station. Safety provisions have been made against abuse of the equipment. For example, a diaphragm valve arrangement is connected to the oil and fuel lines so that should the oil pressures of the motor drop, this will close the fuel valve and stop the motor, eliminating the possibility of damage.

In general, a comparison of the present Oneida power units with the original shows an increase in the strength of some of the parts, increase in horsepower, a more thoroughly developed unit assembly and a change in the auxiliary equipment so as to provide an absolutely dual power plant system.

One of the Northern Pacific cars has been in passenger service between Glendive, Montana and Billings, a distance of 225 miles. The running schedule between these two points is 7 hrs. and 45 min. which includes 18 regular station stops and 25 flag stops. The motorized unit is a combination baggage-passenger car with 21 ft. of baggage space and seating 32 passengers. It is equipped with roller journal bearings and has two 104-hp. motor units for single end control. The power car hauls a standard 60-passenger day coach as a trailer. Another Northern Pacific car has been operated in North Dakota this winter under adverse weather conditions with but little trouble, the major portion of which has resulted from the inexperience of the operators, particularly in maintenance, as the operation of the equipment is said to be readily grasped owing to its similarity to that of an automobile. Another car of the three-compartment type is being motorized at the present time for the Chicago & North Western. It carries practically the same specifications as the Northern Pacific car described in this article and has sufficient power to handle a trailer.



Diagrammatic View of the Operator's Control Station



Side Elevation of the Single Power Unit—the Crank Shaft Size and Number of Bearings Have Been Increased

Surcharge Bill Finally Defeated

Congress adjourns after having passed practically no new railroad legislation

WASHINGTON, D. C.

THE Sixty-Eighth Congress adjourned sine die, and most of the two hundred or more railroad bills which had been introduced during its two sessions expired, at noon on March 4, with practically no new railroad legislation having been placed on the statute books in spite of the strenuous efforts made in that direction by a considerable number of members of Congress. The bill to abolish the Pullman surcharge was overwhelmingly defeated in the House and the Gooding long and short haul bill, after having been once passed in the Senate at the last session and having been tabled by the House committee, was rejected in the Senate when Senator Gooding sought to have it adopted in a modified form as an amendment to the rivers and harbors appropriation bill.

Although many bills had been introduced for the purpose of substituting the judgment of Congress for that of the Interstate Commerce Commission in direct rate-making, none of them finally prevailed, although the Hoch-Smith rate readjustment resolution may perhaps be considered as an indirect effort to reverse ultimately the commission's decisions in the western grain rate cases. None of the bills to repeal or amend the rate-making provisions of the Transportation Act were even reported from committee. During the hearings on the Gooding bill and the surcharge bill in the House committee on interstate and foreign commerce the members got an insight into the complexity of the problems involved and an appreciation of the fact that if they once engaged in direct rate-making they would be flooded with demands from their constituents to take similar action as to other grievances.

House Rejects Surcharge Amendment

The amendment abolishing the Pullman surcharge which the Senate had tacked onto the independent offices appropriation bill as a "rider" was defeated in the House on February 27, after a three-hour debate, by a roll-call vote of 255 to 123, following a rising vote of 177 to 67. Technically the vote was against Representative Barkley's motion to recede from the House disagreement to the Senate amendment and concur in the Senate bill and the bill was therefore sent back to the Senate for its vote as to whether it would endanger the appropriation bill by insisting on its amendment. The arguments used in the various speeches for and against the surcharge were those that had been repeated over and over in the hearings before the Interstate Commerce Commission and the House committee.

The principal arguments that seemed to appeal to the House were that Congress should not engage in direct rate-making or act as an appellate tribunal to the Interstate Commerce Commission, particularly for the benefit of the rate-payers who enjoy a special service, and that as the railroads are not yet earning a fair return a reduction in their revenues at this time would postpone further the possibility of reductions in freight rates or passenger rates. The arguments of those who spoke for the abolition of the surcharge were generally based on their insistence that the surcharge does not represent any particular service on the part of a railroad and that the surcharge revenue goes chiefly to roads that could best afford to lose it. Many of them also took the position that the surcharge is not really a "rate," and that its abolition by Congress would be a declaration of principle rather than direct rate-making.

Representative Oldfield of Arkansas said the commission was not authorized to make "super-rates." Representative McLaughlin of Nebraska complained that the House had been influenced by the work of the railroad lobbyists, saying that two weeks before, in his judgment, two-thirds of the House would have voted against the surcharge, whereas probably the vote would now be in the same proportion against its repeal. Some of those who defended the surcharge pointed out that if the bill were passed it would be possible for one passenger to buy all the space in a Pullman car by paying for only one railroad fare.

Farmers Against Bill

Many of the members had apparently received telegrams from representatives of farmers and others urging them to vote against the surcharge bill and some charged that this was propaganda inspired by the railroads. Representative Hawes of Missouri sent to his office for the 33 telegrams he had received and said he found that 30 of them were in favor of removing the surcharge and 28 of them were identical in the language used, indicating that there was also some propaganda on the other side. Representative Blanton of Texas read a list of the salaries of the Interstate Commerce Commission and its officials, saying that after having created all that machinery of rate-making Congress should not presume to do its work. Some of the speakers said they would not dare to go home and tell their constituents that they had been unable to reduce freight rates but had voted to reduce the expenses of the Pullman passengers.

When the bill was sent back to the Senate that body on March 2, without a record vote, receded from its amendment, which it had passed on two occasions, after a speech by Senator Robinson in which he said the bill had not been defeated on its merits but that its rejection in the House "was accomplished by one of the most powerful lobbies that ever assembled in the city of Washington." The independent offices appropriation bill, carrying the appropriation for the Interstate Commerce Commission, was then finally passed and sent to the President.

Senator Robinson said that 22 bills to abolish the surcharge, some of them identical in language with his bill, had been introduced in the House and that five of those who had introduced such bills had finally voted against the amendment while five were absent. "Not only were hundreds of special representatives, legislative agents and railroad attorneys brought here for the purpose of defeating the measure," he said, "but powerful influences were employed to induce newspapers and other publicity agencies to publish misleading information and statements concerning the purpose and effect of the amendment."

Gooding Bill Rejected in Senate

Senator Gooding met with defeat in his effort to have the Senate again pass his long and short haul bill, in a modified form, by attaching it as a "rider" to an appropriation bill, on February 28, when the Senate voted 40 to 37 to table the amendment. He had previously announced his intention of offering it as an amendment to

the bill for the purchase of the Cape Cod canal by the government, which had passed the House but which its advocates had been unable to bring to a direct vote in the Senate. On February 27 Senator Fernald of Maine offered the Cape Cod canal bill, in the form it had passed the House, as an amendment to the rivers and harbors appropriation bill. Senator Gooding at once offered his fourth section amendment as an amendment to the Fernald amendment and after Senator Fernald had concluded his speech Senator Gooding spoke for over three hours on his amendment.

Although the Senate had passed the original Gooding bill on May 19 by a vote of 54 to 23 a different line-up was presented on the question of adopting it as a rider, because of the danger that its inclusion might prevent the passage in the House of the rivers and harbors bill. After tabling the Gooding amendment the Senate then voted 40 to 36 to table the Fernald amendment and then passed the rivers and harbors bill. Senator Gooding was visibly very angry over the result and said he wanted to serve notice on New England that he had "felt their claws" and that "from now on somebody else will fight their battles if they are going to vote to destroy my section of the country. Perhaps when we build this country over again we will build it better," he said. Senators Walsh and Butler of Massachusetts pointed out that they as well as Senator Fernald had voted for the Gooding amendment.

The amendment which the senator had tried finally to pass was much less drastic than his original bill, simply providing that no further authority shall be granted to the commission to relieve any rail carrier or carriers from the provisions of the fourth section to meet the competition of water transportation, with a proviso that this should not prevent the commission from authorizing departures from the fourth section as to import or export rates or to a block system of express rates. A somewhat similar proposal was included in a bill introduced by Representative Hoch of Kansas, on February 25.

Other Bills

A review of the history of the 200 or more railroad bills introduced in the Sixty-Eighth Congress shows that the record of those on which vigorous fights were made but which did not pass is of much greater importance, both as to the effect of the bills and as to the number of them, than that of the bills that were passed. All of the bills against which the railroads felt it necessary to make a fight were defeated, such as the Howell-Barkley labor bill, the Gooding fourth section bill and the surcharge bill, while none of the bills to amend or repeal section 15-a were reported out of the Senate committee after hearings and the most drastic bils affecting rate-making and valuation such as were introduced by Senators LaFollette and Brookhart, were scarcely considered. Except as to the Gooding and surcharge bills most of the consideration of railroad legislation came during the first session of this Congress and after the election in November practically no efforts were made to pass the more radical bills.

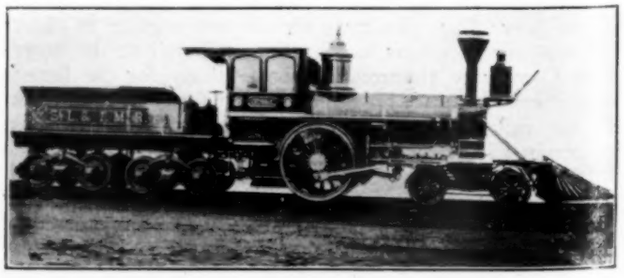
Only two bills and one resolution of general railroad interest were passed by both Houses of Congress, the Hoch-Smith rate resolution, the bill to amend paragraph 3 of section 16 of the commerce act as to the time within which shippers' claims for overcharges must be filed and the Dyer bill to clarify the law relating to the pilfering of freight. There was also a bill to increase the number of locomotive inspectors of the Interstate Commerce Commission and a resolution providing for an investigation of the Northern Pacific land grants. Two bills relating to the use of steel cars were passed by the Senate but not by the House and the Senate passed a bill introduced by Senator Sheppard of Texas to amend paragraph 11, section 20, of the interstate commerce act, so as to extend the liability of the initial carrier under a bill of lading to freight reconsigned or diverted.

Very few bills were introduced in the Sixty-Eighth Congress which were intended to be in the interest of the railways. One such bill, to reduce the rate of interest on railroad indebtedness to the government, at one time seemed to meet with a favorable reception and a hearing was held on it but the bill was amended by the committee so as to make its provisions applicable only to roads in danger of receivership and recently it has been apparent that it had little chance under the confused conditions prevailing in the Senate. The Senate steering committee had once placed this bill on the program of bills to be passed but it was later taken off. Two bills were introduced for the purpose of amending the consolidation provisions of the Transportation Act to encourage voluntary consolidations and they were given a hearing but no effort was made by the railways to do more than lay the foundation for consideration of such legislation in the next Congress.

The most important affirmative action of Congress in the field of railroad legislation was the passage of the resolution directing the Interstate Commerce Commission to make a thorough investigation of the rate structure and to make such readjustments and changes as may be found necessary to correct defects, giving due regard, among other factors, to general and comparative levels in market value and with special reference to the possibility of lowering rates on agricultural products, "in view of the existing depression in agriculture," to the "lowest possible lawful rates compatible with the maintenance of adequate transportation." This resolution, however, is filled with so many qualifying words that its effect will be largely dependent on the attitude of the commission and it is believed by many that the results will not be far different from what they would have been if the commission were to be guided by the law as it stood. The railways did not oppose the passage of this resolution.

No suggestions as to railroad legislation and only two references to the railroad situation were included in President Coolidge's inaugural address. In referring to the expression of the popular will at the last election, he said:

"The policy of public ownership of railroads and certain electric utilities met with unmistakable defeat," and that the people had declared that they wanted their "independence and freedom continued and supported by having the ownership and control of their property, not in the government but in their own hands." In referring to the state of national prosperity he said that "our transportation systems have been gradually recovering and have been able to meet all the requirements of the service."



In the Early Days on the Iron Mountain

Report on Oakland Collision

Excessive speed defeated an efficient automatic train-stop apparatus—Ten persons killed

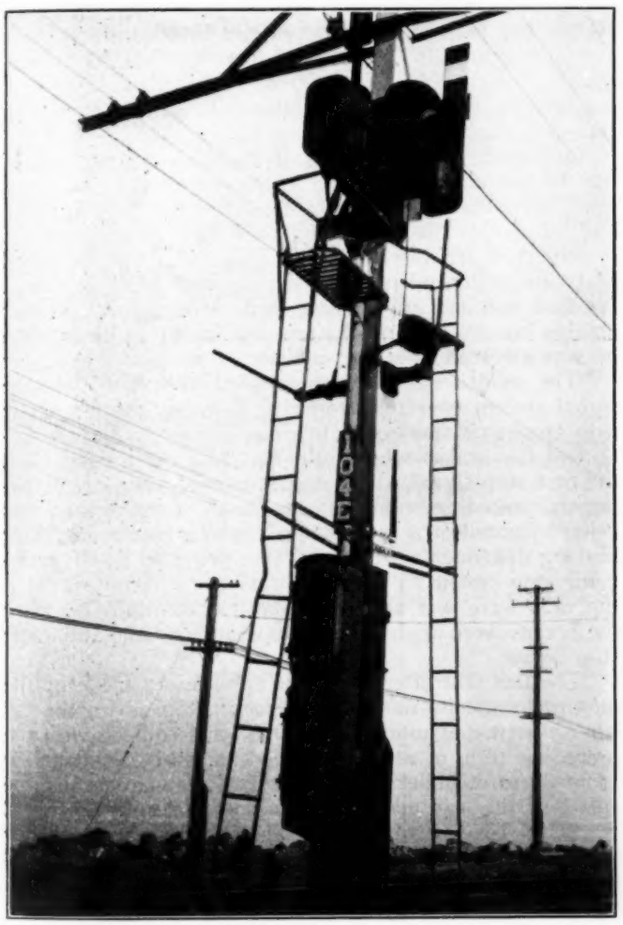
THE Interstate Commerce Commission has issued a report, accompanied by a diagram and other illustrations, on the investigation by the Bureau of Safety of the rear collision of westbound passenger trains on the line of the Key System Transit Company, at Oakland, Cal., on December 4, when eight passengers and two employees (off duty) were killed and 36 passengess and 2 employees were injured. Train No. 15 of the San Francisco-Sacramento Railroad, consisting of a single electric car, No. 1014, moving at about 20 miles an hour, ran into the rear of train No. 729 of the Key System, consisting of four cars, which had been stopped because of delayed trains ahead; and the rear car of the standing train was crushed for a length of 18 ft.

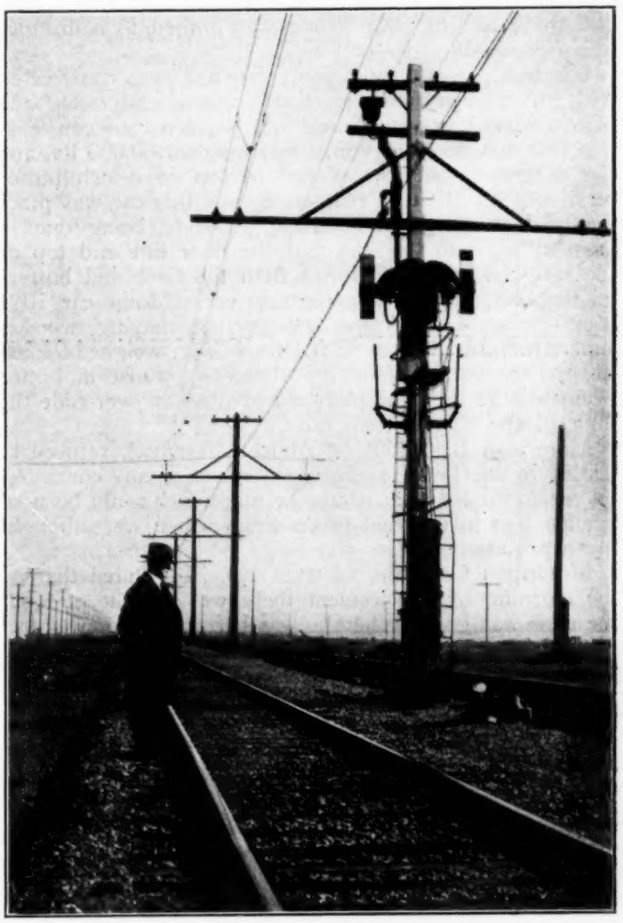
This line, double track, is equipped with automatic block signals, 420 ft. apart, and each signal has, connected with the semaphore arm, an automatic stop, arranged to apply the brakes of passing trains by striking a trip on the top of the car.

The signals and the automatic stop worked properly, but the braking distance, which is calculated for a speed of 36 miles an hour was insufficient, train No. 15 having been run at excessive speed.

The report gives the cause as the failure of Motorman Brubaker to observe the rules and obey the block signal indications; and it is stated that the trains "were permitted" to be operated thus. "The Key System Transit Company should at once establish a maximum speed restriction."

The report describes the Key System Transit line as an electric railway using 600 volts direct current for propulsion purposes, with an automatic block-signal system using three-position, upper-quadrant type semaphores and an automatic train stop of the overhead mechanical trip type. Alternating current control circuits and single-rail track circuits are used. The signals are mounted on trolley poles set between the two main tracks and the automatic stop arm is connected to the spectacle casting of each signal and operates simultaneously therewith. When the signal is set against a train the stop arm is





Automatic Block Signal No. 104, Looking East

Fig. 1—Westbound signal at stop; blade horizontal and automatic stop arm in position to strike the trip on the car. Eastbound blade and stop arm vertical.

Fig. 2—Both eastbound and westbound signals clear; both blades and both arms vertical.

in position to engage the arm of a valve located on the car roof. In the vicinity of the point of accident trolley poles are spaced 105 ft. apart and signals and automatic stops are installed on each fourth pole, or 420 ft. apart. The control circuits cause the display of one caution and two stop signals behind each train. The arrangement is intended to provide for the movement of trains under a headway of 45 seconds and was designed to provide adequate braking distance for Key System trains which with the propulsion current used are operated at a maximum speed of approximately 36 miles an hour; and at this speed require a distance of from 300 ft. to 350 ft. in which to stop.

The collision occurred on a straight line opposite signal 104, located at a point about 1¼ miles east of the Pier Terminal, at about 7.54 a. m. A light rain was falling and the range of clear vision was limited to a distance of approximately one-half mile.

Car 665, the one most badly crushed, was constructed with steel underframe, steel side frame and steel body plates, having wooden lining and wooden roof construction. It was 57 ft. 7½ in. long, weighed 60,000 lb., and the distance from top of rail to top of 8-inch buffer beam was 48 in. The rear portion of this car was practically demolished, the damage probably being due in part, at least, to the fact that the floor line and top of the body buffers were lower than the floor and buffers on the San Francisco-Sacramento car. Motor car 1014 was of steel-underframe construction, having wooden superstructure. It was 57 ft. 10 in. long, weighed 93,260 lb., and the distance from top of rail to top of 8-in. buffer beam was 53 in. The platform of this car over-rode the floor of the Key System car.

Motorman Brubaker, on advice of counsel, refused to testify and declined to give a statement of any character, on the ground that anything he might say could be used against him in criminal proceedings which were thought to be pending.

Motorman Compton, of train No. 729, stated that on the morning of the accident there was a light rain but the view was good. When he was stopped he immediately sounded a whistle signal for the flagman to go back, and then released the brakes; within 30 or 35 seconds after stopping he felt the shock of the impact which moved his train forward a distance of 3 ft. to 4 ft.

Conductor Knoblock, of train No. 15, estimated that when the service application was made by the motorman the speed of his train was from 35 to 40 miles an hour, and he thought that perhaps 30 seconds elapsed before the emergency application occurred. After the emergency application he thought the brakes locked the wheels as the car seemed to slide forward until the impact of collision came.

Motorman Willis, of the train which followed train No. 15, stated that he operated his train under clear signals at a speed of about 30 miles an hour. His range of vision extended for at least half a mile, and after passing through the subway under the Southern Pacific west of tower No. 2, train No. 15 was constantly in view until the time of the collision. He thought that train was running at a higher rate of speed than he was able to attain.

Towerman Corker, who was on duty at tower No. 2, stated that train No. 15 left tower No. 2 as soon as the switches were lined up for its route, the signal cleared, and the flagman recalled, which he thought was about 45 seconds after the departure of train No. 729. No exact record of the time of departure of trains from that point is kept.

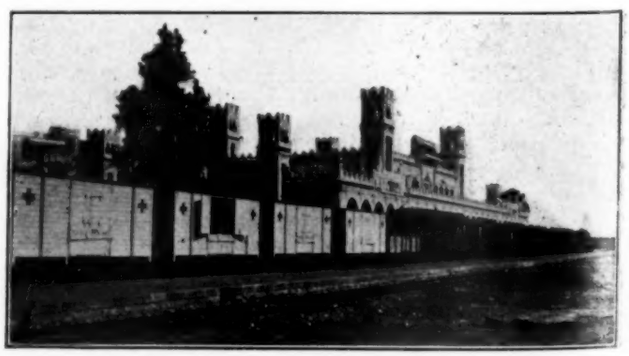
The signal circuits are so arranged that when a train receives a clear signal indication the signal remains in clear position until the last pair of wheels passes the insulated joint in the track opposite the signal. The purpose of this arrangement is to prevent the signal and automatic stop arm from assuming the danger position until the arms of the automatic stop valves on all cars in the train have passed the signal. The body of a Key System car overhangs the rear axle a distance of about 7 ft. 6 in. and the insulated joint at signal 104 is located 4 ft. 6 in. west of the trolley pole on which this signal is mounted. Assuming that train No. 729 stopped with its rear axle just clearing the insulated joint at signal 104 there would be two stop signals displayed, signal 104, located practically at the rear end of the train, and the other, signal 108, 420 ft. in rear of it; a caution indication would be displayed by signal 112, 840 ft. from the rear of the train.

Engineer Bell of the Key System stated that the signal system had been placed in service in 1911, and that there are approximately 18,000,000 forty-five degree movements in each year. During the entire time the system has been in service only four false clear failures have been reported, the last of which occurred in 1916.

Superintendent Thornton, of the Key System, stated that he instructs train-service employees of the San Francisco-Sacramento as to their duties on the Key Division and all motormen understand that they are required to operate their trains under clear signals and that the speed of trains is dependent upon the distance of clear vision. He had not had any trouble with Motorman Brubaker on this line except once before, on March 1, 1922, when he was involved in a rear collision.

"The evidence clearly established the fact that the signal system operated properly; also that the automatic stop apparatus functioned to cause an automatic application of the brakes when train No. 15 passed signal 108, the first stop signal which it encountered when approaching the preceding train; but * * * train No. 15 was being operated at a rate of speed which required greater braking distance than the minimum provided by the automatic stop system; a further contributing factor was that the rails were wet and the wheels locked and slid after the brakes were applied by the operation of the automatic stop device.

"The fact that after the brake applications made by the motorman and by the automatic train-stop device the car ran a distance of more than 400 ft., and collided with the preceding train at a rate of speed variously estimated at from 20 to 30 miles an hour makes it apparent that the speed of this car materially exceeded 36 miles an hour. * * * In view of the refusal of Motorman Brubaker to furnish any statement in the matter, no explanation of his failure to observe and obey caution and stop signals can be advanced."



Red Cross Train with Wounded at Tetuan, Morocco

General News Department

On March 1 the Chesapeake & Ohio began the operation of its passenger trains into Central Station in Chicago instead of the Dearborn street station, which it has used under lease.

The New England Railroad Club will hold its annual meeting at the Copley-Plaza Hotel, Boston, on Tuesday evening, March 10. The principal speaker will be J. W. Redmond, general counsel of the Central Vermont.

The Signal Section of the American Railway Association has made arrangements to broadcast from station WGN on the Drake Hotel, Chicago, the music and an address to be given at the annual dinner of the Signal section at that hotel on the evening of March 12. The dinner will also commemorate the 30th anniversary of the birth of the Section, which started in March, 1895, as the Railway Signaling Club.

Two robbers succeeded in taking valuables amounting to $10,000 from day coach passengers on a New York Central train entering Chicago on February 26. The two men boarded the train at Toledo, Ohio, and sat quietly in a day coach until the train was passing through Chesterton, Ind., at 8:30 p. m., when, they produced a sawed-off shotgun and a revolver, from a suitcase which they carried, and held up a dozen passengers in a Pullman. When the train stopped at Gary, Ind., the men left the train and disappeared.

The railroad commissioners of South Carolina, in their annual report recently sent to the legislature, recommend that a law be adopted "similar to those in effect in other states" to require automobiles to be stopped before passing over a railroad. Judging from results obtained in other states the commissioners are of opinion that "at least a temporary" law of this character should be enacted. It is believed that such a law would reduce fatalities until something definite can be developed. The commissioners also recommend laws to regulate motor buses.

Long Island's Electric Car Shop Destroyed by Fire—to Be Rebuilt Immediately

One of the buildings—a two-story, brick structure 91 ft. by 218 ft.—at the Long Island's shops at Morris Park, L. I., was totally destroyed on the morning of March 2 by a fire of unknown origin, involving a total loss in building and contents of approximately $500,000. The building was used primarily for repairs to electric cars and included also a car-wheel shop, an air brake shop, a pipe shop, upholstery shop and a brass-dipping room. No cars were destroyed in the fire but all the tools and equipment which the building contained, including several motor trucks, were totally destroyed. The company expects to rebuild and to replace the shop equipment destroyed immediately.

Part of Federal Control Appropriations Returned to Treasury

Of the appropriations made by Congress for federal control of the railroads $440,000,000 will be officially returned to the Treasury out of the unexpended balance to the credit of the Railroad Administration. This is provided for by a clause in the second deficiency appropriation bill, which was passed by the House of Representatives on February 26. The amount is already in the Treasury as part of the cash collected by the Railroad Administration in its settlements with the carriers. In explaining this to the House, Chairman Madden of the appropriations committee said:

"I think the director general of railroads has done a remarkable job. He has reduced the force in his office from January, 1924, to January, 1925, from 779 to 400, and he will have reduced his force by the 1st of July to about 168. The office will have to be kept open for some time to come in order to make settlements. In addition to this $440,000,000, against which he has not drawn, he has a special account in the Treasury of $41,300,000; he has $10,500,000 on deposit with the Interstate Commerce Commission against which they can draw to pay judgments against the agent of the president growing out of federal control; he has on deposit $56,000 in the District National Bank, and about $6,000 in a Canadian bank, placed there for use on account of exchange rates. He is expecting to collect from the Pennsylvania Railroad within the next three months about $20,000,000, and $10,000,000 from other roads, which will be deposited in this fund in the Treasury. He has $174,000,000 of securities for loans made by the administration during the war to the New Haven, to the Boston & Maine and to the St. Paul, all of which is drawing 6 per cent interest. Out of these funds and the interest received he will be able to pay all the expenses of his office; he will be able to meet every obligation that may be created as the result of any settlement, and there will be no more call for the appropriation of money in connection with railroad settlements out of the Treasury of the United States. Thank God for that. [Applause.] It has been a long siege."

Washington to New York in 220½ Minutes

Sixty-one miles an hour was the time made by a special train over the Pennsylvania Railroad from Washington to New York on the afternoon of March 4, carrying films for showing in New York a motion picture of the inauguration of President Coolidge. The distance is 224 miles, and the time includes seven minutes taken for changing engines at Manhattan Transfer. The train left Washington at 12:09½ and arrived in New York at 3:50. Other motion-picture concerns employed airplanes to send their films to Philadelphia, Chicago and San Francisco. To New York the films sent by rail were ready sooner, as the time on the road was utilized for developing and drying the films.

This train-run is the fastest ever made between these two cities.

Meetings and Conventions

The following list gives names of secretaries, dates of next or regular meetings and places of meetings.

AIR BRAKE ASSOCIATION.—F. M. Nellis, 165 Broadway, New York City. Next Convention, May 26-29, 1925, Alexandria Hotel, Los Angeles, Calif. Exhibit by Air Brake Appliance Association.

AIR BRAKE APPLIANCE ASSOCIATION.—John B. Wright, Westinghouse Air Brake Co. Meeting with Air Brake Association.

AMERICAN ASSOCIATION OF ENGINEERS.—C. E. Drayer, 63 E. Adams St., Chicago. Next convention, 1925, Orlando, Fla.

AMERICAN ASSOCIATION OF FREIGHT TRAFFIC OFFICERS.—Grant Williams, 1341 Railway Exchange, Chicago.

AMERICAN ASSOCIATION OF GENERAL BAGGAGE AGENTS.—E. L. Duncan, 332 So. Michigan Ave., Chicago. Annual meeting, June 23, 1925, Portland, Ore.

AMERICAN ASSOCIATION OF PASSENGER TRAFFIC OFFICERS.—W. C. Hope, C. R. R. of N. J., 143 Liberty St., New York.

AMERICAN ASSOCIATION OF RAILROAD SUPERINTENDENTS.—J. Rothschild, Room 400, Union Station, St. Louis, Mo. Next convention, June 16-19, 1925, Richmond, Va.

AMERICAN ASSOCIATION OF SUPERINTENDENTS OF DINING CARS.—C. H. Shircliffe, Chicago & North Western Ry., Chicago. Annual meeting, October 6, Hotel Statler, St. Louis, Mo.

AMERICAN ELECTRIC RAILWAY ASSOCIATION.—J. W. Welsh, 8 W. 40th St., New York.

AMERICAN RAILROAD MASTER TINNERS', COPPERSMITHS' AND PIPE FITTERS' ASSOCIATION.—C. Borcherdt, 202 North Hamilton Ave., Chicago, Ill.

AMERICAN RAILWAY ASSOCIATION.—H. J. Forster, 30 Vesey St., New York, N. Y.

Division I.—Operating.—J. C. Caviston, 30 Vesey St., New York.

Freight Station Section (including former activities of American Association of Freight Agents).—R. O. Wells, Freight Agent, Illinois Central Railroad, Chicago, Ill. Next meeting, May 19-21, 1925, Kansas City, Mo.

Medical and Surgical Section.—J. C. Caviston, 30 Vesey St., New York, N. Y.

Protective Section (including former activities of the American Railway Chief Special Agents and Chiefs of Police Association).—J. C. Caviston, 30 Vesey St., New York, N. Y.

Safety Section.—J. C. Caviston, 30 Vesey St., New York. Annual meeting, April 28-30, Morrison Hotel, Chicago.

Telegraph and Telephone Section (including former activities of the Association of Railroad Telegraph Superintendents). W. A. Fairbanks, 30 Vesey St., New York.

Division II.—Transportation (including former activities of the

(*Continued on page 576*)

Freight Operating Statistics of Large Steam Roads—Selected Items for December, 1924,

Region, road and year	Average miles of road operated	Train-miles	Locomotive-miles: Principal and helper	Locomotive-miles: Light	Car-miles: Loaded (thousands)	Car-miles: Per cent loaded	Ton-miles (thousands): Gross, Excluding locomotive and tender	Ton-miles (thousands): Net, Revenue and non-revenue	Average number of locomotives on line daily: Serviceable	Unserviceable	Per cent unserviceable	Stored
New England Region:												
Boston & Albany	1924 394	276,737	298,218	33,250	5,016	65.6	264,813	191,260	129	15	10.5	...
	1923 394	290,488	311,213	33,103	5,363	65.5	286,508	113,146	119	26	17.9	...
Boston & Maine	1924 2,429	519,822	598,836	58,902	12,082	68.2	622,528	249,714	336	123	26.8	35
	1923 2,455	564,294	619,951	55,049	12,046	67.7	635,074	259,579	349	127	26.8	30
N. Y., New H. & Hartf.	1924 1,931	490,649	515,710	31,925	12,420	68.9	635,481	262,377	297	73	19.8	22
	1923 1,974	496,029	524,174	34,905	11,951	68.7	615,768	259,622	293	78	21.1	6
Great Lakes Region:												
Delaware & Hudson	1924 888	377,663	506,901	46,606	9,534	63.4	619,671	310,992	240	39	14.0	66
	1923 887	387,553	549,042	53,533	10,191	61.7	682,955	339,032	258	41	13.6	45
Del., Lack. & Western	1924 993	579,988	692,863	96,157	17,076	66.4	994,116	445,168	293	69	19.0	9
	1923 993	584,028	722,157	112,750	17,150	64.1	994,775	437,959	285	72	20.1	3
Erie (inc. Chic. & Erie)	1924 2,325	911,018	1,003,664	97,604	30,038	64.2	1,814,645	799,438	662	93	12.3	169
	1923 2,309	994,765	1,128,142	81,163	34,143	65.2	2,076,742	949,316	663	129	16.2	139
Lehigh Valley	1924 1,357	574,267	630,721	68,751	16,703	62.1	1,032,775	465,497	458	58	11.3	102
	1923 1,317	648,232	716,182	87,838	17,443	61.7	1,085,688	499,757	427	98	18.7	28
Michigan Central	1924 1,826	578,028	592,463	19,955	16,982	61.6	939,123	347,518	307	57	15.8	87
	1923 1,827	580,360	596,289	21,162	17,965	63.5	968,417	373,152	320	55	14.6	75
New York Central	1924 6,447	2,167,961	2,446,842	181,741	71,120	61.4	4,409,307	1,930,579	1,175	413	26.0	248
	1923 6,469	2,188,638	2,476,456	172,480	73,592	59.4	4,568,864	1,935,753	1,294	376	22.5	344
New York, Chic. & St. L.	1924 1,669	707,809	719,043	5,890	19,302	64.5	1,074,311	428,972	250	63	20.0	45
	1923 1,669	771,779	781,592	3,324	19,892	64.0	1,107,689	444,169	221	68	23.4	9
Pere Marquette	1924 2,200	393,482	401,531	9,031	8,788	62.8	525,661	245,661	192	25	11.6	21
	1923 2,197	390,406	405,442	8,471	9,317	64.0	533,829	241,070	192	28	12.6	13
Pitts. & Lake Erie	1924 231	130,403	131,225	2,210	4,358	62.0	339,587	198,170	65	21	24.3	9
	1923 231	129,052	139,813	1,351	4,353	60.2	336,760	193,526	72	15	17.0	16
Wabash	1924 2,497	674,048	709,683	10,756	19,303	68.8	1,070,504	452,535	290	54	15.8	22
	1923 2,418	696,524	739,660	11,443	18,459	66.9	1,026,578	423,872	289	49	14.4	1
Central Eastern Region:												
Baltimore & Ohio	1924 5,207	1,883,842	2,188,062	161,487	48,452	61.1	3,117,804	1,478,780	963	311	24.4	134
	1923 5,212	1,830,367	2,096,344	177,734	47,730	60.7	3,037,318	1,429,021	1,118	203	15.4	239
Central of New Jersey	1924 692	279,832	306,036	36,105	6,451	58.0	425,745	203,985	226	49	17.7	30
	1923 693	280,798	309,298	38,334	6,636	60.8	434,237	209,173	232	47	16.7	26
Chicago & Eastern Ill.	1924 945	283,385	289,603	4,703	6,713	63.6	419,854	209,863	122	30	19.9	30
	1923 945	250,189	252,676	3,818	5,943	59.7	377,419	182,260	124	50	28.8	28
Cleve., Cin., Chic. & St. L.	1924 2,389	796,157	856,612	17,719	22,163	60.1	1,476,576	700,712	351	88	20.0	21
	1923 2,377	689,455	725,340	7,185	19,674	60.0	1,280,402	602,993	351	96	21.4	51
Elgin, Joliet & Eastern[1]	1924 460	127,271	141,697	8,080	3,521	63.6	272,266	143,873	77	20	20.4	3
	1923 460	116,262	129,331	8,435	3,534	64.6	273,505	146,389	96	17	15.2	18
Long Island	1924 393	44,569	49,757	10,905	556	58.8	34,246	13,265	42	13	24.1	4
	1923 393	44,736	52,134	8,732	576	57.8	34,960	13,342	39	11	22.7	...
Pennsylvania System	1924 10,953	4,576,557	4,982,807	369,177	117,492	62.1	7,932,657	3,751,860	2,637	871	24.8	70
	1923 10,906	4,493,350	4,881,193	344,964	116,224	62.9	7,788,392	3,759,011	2,898	616	17.5	380
Reading	1924 1,141	692,974	764,231	74,961	15,848	59.0	1,118,782	568,414	408	82	16.7	74
	1923 1,141	669,466	744,260	78,163	15,815	60.6	1,077,824	550,213	339	111	24.7	46
Pocahontas Region:												
Chesapeake & Ohio	1924 2,555	1,132,123	1,197,272	34,803	30,665	54.7	2,457,785	1,309,504	488	104	17.5	18
	1923 2,553	967,169	1,069,489	30,364	25,730	54.2	1,964,960	1,063,955	425	107	20.1	26
Norfolk & Western	1924 2,230	862,882	1,027,480	32,063	23,848	59.4	1,940,049	1,028,603	572	100	14.9	126
	1923 2,230	800,386	988,719	28,271	22,231	58.6	1,761,989	923,874	558	125	18.3	88
Southern Region:												
Atlantic Coast Line	1924 4,870	815,605	834,918	13,766	20,351	63.4	1,080,432	426,491	389	57	12.7	51
	1923 4,868	791,372	796,481	13,168	18,232	60.5	980,038	366,116	367	64	14.8	18
Central of Georgia	1924 1,907	323,644	324,922	5,032	6,675	70.0	359,668	159,059	135	14	9.5	11
	1923 1,907	290,341	290,983	5,534	5,645	66.3	308,947	132,296	123	21	14.9	3
I. C. (inc. Y. & M. V.)	1924 6,225	1,855,042	1,879,414	43,172	49,248	63.8	3,074,873	1,369,666	769	107	12.2	27
	1923 6,196	1,821,255	1,838,591	39,221	46,364	59.1	3,036,216	1,322,822	774	122	13.6	5
Louisville & Nashville	1924 5,027	1,765,391	1,920,843	72,849	32,328	61.3	2,161,516	1,055,370	587	110	15.7	5
	1923 5,026	1,617,171	1,712,289	61,279	27,360	59.5	1,810,515	845,950	628	91	12.6	4
Seaboard Air Line	1924 3,551	549,494	561,985	11,104	12,930	64.2	728,451	287,923	218	42	16.1	...
	1923 3,553	541,625	551,123	8,484	11,532	60.7	664,008	247,677	211	48	18.4	...
Southern Ry.	1924 6,840	1,475,101	1,507,532	34,659	32,215	63.3	1,816,617	716,957	857	112	11.6	17
	1923 6,942	1,423,864	1,454,912	29,835	31,097	63.5	1,701,673	691,918	845	134	13.7	4
Northwestern Region:												
Chic. & North Western	1924 8,463	1,477,906	1,518,316	26,377	30,477	62.7	1,742,533	693,007	767	273	26.2	110
	1923 8,463	1,530,947	1,601,584	19,167	33,210	61.1	1,981,753	807,519	879	198	18.4	92
Chic., Milw. & St. P.	1924 10,987	1,610,984	1,707,565	82,520	40,705	67.0	2,311,736	1,049,378	979	160	14.1	99
	1923 10,987	1,645,376	1,694,073	64,803	40,837	65.6	2,320,742	1,047,893	964	176	15.4	107
Chic., St. P., Minn. & Om.	1924 1,726	348,943	374,580	16,576	5,874	65.7	330,910	140,711	157	38	19.6	3
	1923 1,726	318,577	339,725	14,615	5,772	65.1	322,252	132,849	170	40	18.9	7
Great Northern	1924 8,251	853,745	881,186	43,977	23,041	70.7	1,295,336	624,598	634	130	17.0	115
	1923 8,251	777,103	810,177	47,577	21,325	70.4	1,197,951	557,912	621	128	17.0	106
M., St. P. & S. Ste. M.	1924 4,375	538,403	551,525	6,329	11,651	72.7	595,665	276,613	307	37	10.6	20
	1923 4,374	465,308	474,081	8,017	10,603	69.6	544,650	246,616	291	52	15.2	20
Northern Pacific	1924 6,447	857,276	895,807	47,798	23,152	72.2	1,287,612	612,836	539	156	22.4	81
	1923 6,415	755,390	785,994	41,852	21,247	72.2	1,186,535	556,568	571	166	22.5	76
Oreg.-Wash. R. R. & Nav.	1924 2,185	191,463	206,555	21,708	4,947	71.9	283,304	132,824	141	23	14.0	13
	1923 2,180	191,174	200,362	18,133	4,621	72.6	261,555	123,439	139	25	15.2	14
Central Western Region:												
Atch., Top. & S. Fe (incl. P. & S. F.)	1924 10,002	1,658,396	1,771,760	88,239	46,010	62.9	2,712,604	1,003,932	805	181	18.3	162
	1923 9,855	1,603,717	1,704,953	83,065	43,825	61.9	2,548,092	897,412	789	173	18.0	123
Chicago & Alton	1924 1,022	340,545	352,798	4,060	7,202	62.4	438,359	187,048	117	28	19.0	8
	1923 1,010	310,278	315,998	4,798	6,854	58.8	430,926	190,448	129	25	16.3	26
Chic., Burl. & Quincy	1924 9,326	1,656,747	1,743,882	79,016	41,375	62.1	2,546,775	1,195,015	815	206	20.2	20
	1923 9,338	1,596,189	1,657,066	72,660	41,301	62.0	2,504,030	1,145,029	799	222	21.7	26
Chic., Rock I. & Pacific	1924 7,578	1,355,541	1,385,352	11,970	29,157	64.5	1,610,997	660,056	571	183	24.3	54
	1923 7,635	1,443,490	1,481,064	22,112	29,922	61.0	1,729,853	689,143	546	218	28.5	28
Denver & R. G. Wn.	1924 2,567	246,019	302,597	55,564	5,518	67.3	326,513	156,090	248	58	18.8	42
	1923 2,593	255,959	316,938	57,807	5,423	66.4	322,714	152,267	229	91	28.4	37
Oregon Short Line	1924 2,392	330,421	351,969	24,368	8,013	67.3	492,389	299,766	207	26	11.3	63
	1923 2,367	350,284	366,286	24,513	8,000	67.5	483,740	223,530	205	31	13.1	47
Southern Pacific (Pacific System)	1924 8,515	1,254,699	1,370,982	200,434	34,280	65.1	2,037,008	834,617	719	235	24.6	95
	1923 8,451	1,499,861	1,658,448	267,798	37,937	59.8	2,345,886	893,050	705	182	20.5	36
Union Pacific	1924 3,688	887,082	914,778	49,574	28,240	74.5	1,492,466	648,162	494	61	11.1	211
	1923 3,712	957,721	982,607	61,419	30,466	70.4	1,663,954	694,579	479	71	13.0	162
Southwestern Region:												
Gulf, Colo. & S. Fe	1924 1,897	316,446	327,482	6,857	9,053	62.8	539,286	229,426	120	21	14.8	1
	1923 1,897	240,432	249,576	6,246	6,414	64.0	368,502	154,744	127	31	19.4	10
Mo.-Kans.-Tex.	1924 1,787	276,823	276,852	7,477	8,287	61.1	484,057	191,747	120	32	20.8	30
	1923 1,801	251,173	251,587	5,975	7,477	58.5	437,034	167,036	157	44	21.7	75
Mo.-Kans.-Tex. of Tex.	1924 1,389	259,289	268,038	10,179	6,395	59.7	374,955	144,008	105	24	18.8	17
	1923 1,389	187,069	192,188	3,893	4,220	58.8	244,756	89,852	96	27	22.0	20
Missouri Pacific	1924 7,277	1,388,785	1,421,202	49,615	33,295	66.6	1,948,670	893,312	532	99	15.6	...
	1923 7,305	1,158,254	1,166,876	37,014	28,171	63.4	1,645,250	712,229	419	196	31.8	...
St. Louis-San Francisco	1924 4,683	900,745	918,757	16,154	17,901	65.4	1,025,632	443,628	419	70	14.3	18
	1923 4,683	814,951	828,823	17,897	15,186	61.0	898,682	369,941	406	92	18.5	21
Southern Pacific Lines (in Tex. and La.)[2]	1924 3,716	627,653	629,556	7,522	13,821	63.8	801,062	328,409	211	66	23.8	8
	1923 3,710	683,431	685,402	4,628	13,695	59.8	851,485	352,808	237	59	19.8	11
Texas & Pacific	1924 1,953	329,807	329,807	2,782	7,520	63.5	432,262	164,658	156	42	21.2	9
	1923 1,953	305,307	305,307	3,041	6,813	60.4	392,416	144,351	173	31	15.3	10

[1] No passenger-train service.
[2] Includes Galveston, Harrisburg & San Antonio, Houston & Shreveport, Houston & Texas Central, Houston East & West Texas, Iberia & Vermilion, Lake Charles & Northern, Louisiana Western, Morgan's La. & Tex. R. R. & S. S. Co., and Texas & New Orleans.

Compared with December, 1923, for Roads with Annual Operating Revenues Above $25,000,000

Region, road and year	Average number of freight cars on line daily: Home	Foreign	Total	Per cent unserviceable	Stored	Gross tons per train, excluding locomotive and tender	Net tons per train	Net tons per loaded car	Net ton-miles per car-day	Car miles per car-day	Net ton-miles per mile of road per day	Pounds of coal per 1,000 gross ton-miles including locomotive and tender	Locomotive miles per locomotive day
New England Region:													
Boston & Albany....1924	2,586	5,716	8,302	2.8	197	957	366	20.2	393	29.7	8,292	222	74.2
1923	1,990	5,926	7,916	3.5	...	986	389	21.1	461	33.4	9,265	202	76.8
Boston & Maine....1924	13,263	15,837	29,100	9.5	...	1,198	480	20.7	277	19.6	3,316	164	46.2
1923	14,022	16,955	30,977	11.2	...	1,125	460	21.5	270	18.5	3,411	173	45.7
N. Y., New H. & Hartf...1924	18,558	19,201	37,759	21.5	471	1,295	535	21.1	224	15.4	4,382	156	47.7
1923	20,459	17,675	38,134	18.7	...	1,241	523	21.7	220	14.7	4,242	166	48.6
Great Lakes Region:													
Delaware & Hudson....1924	8,816	5,800	14,616	6.7	...	1,641	823	32.6	686	33.2	11,298	194	63.9
1923	9,361	6,238	15,599	5.2	...	1,762	875	33.3	701	34.2	12,323	209	65.0
Del., Lack. & Western....1924	17,170	9,163	26,333	4.4	43	1,714	768	26.1	545	31.5	14,468	186	74.0
1923	15,435	11,224	26,659	4.0	110	1,703	750	25.5	530	32.4	14,226	192	75.4
Erie (inc. Chic. & Erie)...1924	37,319	20,065	57,384	6.2	13,512	1,992	878	26.6	449	26.3	11,093	151	47.1
1923	29,769	20,587	50,356	6.5	...	2,088	954	27.8	608	33.6	13,260	139	49.3
Lehigh Valley 1924	22,797	10,331	33,128	6.5	125	1,798	811	27.9	453	26.2	11,069	169	43.7
1923	22,316	11,954	34,270	5.4	350	1,675	771	28.7	470	26.6	12,242	178	49.4
Michigan Central 1924	14,663	15,646	30,309	5.6	1,492	1,625	601	20.5	370	29.4	6,140	142	54.3
1923	12,299	17,199	29,498	5.9	1,536	1,669	643	20.8	408	31.0	6,590	136	53.2
New York Central....1924	69,880	67,980	137,860	4.1	19,593	2,034	891	27.1	452	27.1	9,660	147	53.4
1923	61,966	83,303	145,269	5.9	13,663	2,088	885	26.3	430	27.5	9,654	130	51.2
New York, Chic. & St. L..1924	10,945	11,419	22,364	4.9	3,020	1,518	606	22.2	619	43.2	8,293	145	74.9
1923	9,554	11,110	20,664	5.7	1,910	1,435	576	22.3	693	48.5	8,582	145	87.7
Pere Marquette 1924	9,844	10,304	20,148	6.5	1,551	1,336	624	28.0	393	22.4	3,602	145	61.0
1923	8,984	12,044	21,028	3.1	1,645	1,367	618	25.9	370	22.3	3,539	141	60.8
Pitts. & Lake Erie....1924	13,203	8,044	21,247	5.0	1,648	2,604	1,520	45.5	301	10.7	27,619	79	50.5
1923	10,486	10,102	20,588	3.1	1,131	2,609	1,500	44.5	303	11.3	27,000	86	52.2
Wabash 1924	13,000	11,378	24,378	2.6	714	1,588	671	23.4	599	37.1	5,846	164	67.6
1923	11,028	13,746	24,774	2.4	509	1,474	609	23.0	552	36.0	5,655	164	71.9
Central Eastern Region:													
Baltimore & Ohio....1924	69,423	34,340	103,763	11.5	3,936	1,655	785	30.5	460	24.6	9,161	183	59.5
1923	64,594	36,856	101,450	5.9	14,349	1,659	781	29.9	454	25.0	8,844	192	55.5
Central of New Jersey....1924	18,140	10,335	28,475	3.3	3,216	1,521	729	31.6	231	12.6	9,506	202	40.1
1923	15,943	11,527	27,470	7.0	1,199	1,546	745	31.5	246	12.8	9,731	204	40.2
Chicago & Eastern Ill....1924	14,477	4,481	18,958	22.6	892	1,482	741	31.3	356	17.9	7,163	196	62.5
1923	14,352	4,359	18,711	13.7	3,013	1,509	728	30.7	313	17.1	6,221	196	47.5
Cleve., Cin., Chic. & St. L.1924	14,121	20,533	34,654	4.8	2,601	1,855	880	31.6	652	34.3	9,460	148	64.2
1923	15,273	21,691	36,964	5.1	5,418	1,857	875	30.6	526	28.6	8,185	137	53.0
Elgin, Joliet & Eastern[1]...1924	9,732	7,100	16,832	8.5	941	2,139	1,130	40.9	276	10.6	10,094	162	49.8
1923	9,917	6,009	15,926	5.7	...	2,352	1,259	41.4	297	11.1	10,272	137	39.4
Long Island 1924	1,854	4,420	6,274	0.9	163	768	298	23.9	68	4.9	1,088	336	35.7
1923	1,526	5,517	7,043	0.9	22	781	298	23.2	61	4.6	1,094	356	39.5
Pennsylvania System 1924	206,316	89,915	296,231	9.8	37,849	1,733	820	31.9	409	20.6	11,050	152	49.2
1923	190,422	102,148	292,570	5.9	48,068	1,733	837	32.3	414	20.4	11,119	154	48.0
Reading 1924	24,101	15,832	39,933	2.0	4,057	1,614	820	35.9	459	21.7	16,076	191	55.3
1923	19,645	18,319	37,964	3.3	...	1,610	822	34.8	468	22.2	15,550	187	59.0
Pocahontas Region:													
Chesapeake & Ohio....1924	27,745	12,670	40,415	3.7	1,406	2,171	1,157	42.7	1,045	44.7	16,533	134	67.2
1923	30,929	10,291	41,220	6.4	2,433	2,032	1,100	41.4	833	37.1	13,444	146	66.8
Norfolk & Western....1924	28,659	9,119	37,778	3.1	1,442	2,248	1,192	43.1	878	34.2	14,879	183	50.8
1923	27,871	9,712	37,583	3.0	1,242	2,201	1,154	41.6	793	32.5	13,363	189	48.0
Southern Region:													
Atlantic Coast Line....1924	20,353	15,204	35,557	5.2	...	1,325	523	21.0	381	28.8	2,825	129	61.4
1923	19,555	16,461	36,016	3.4	...	1,238	463	20.1	328	27.0	2,426	141	60.7
Central of Georgia....1924	3,589	5,350	9,339	6.1	...	1,111	492	23.8	549	32.9	2,691	172	71.4
1923	3,868	4,941	8,809	4.9	...	1,064	456	23.4	485	31.2	2,238	163	66.4
I. C. (inc. Y. & M. V.)..1924	41,120	22,697	63,817	3.8	...	1,658	738	27.8	692	39.0	7,097	155	70.8
1923	42,900	23,618	66,518	4.4	505	1,667	726	28.5	642	38.0	6,888	152	67.7
Louisville & Nashville....1924	41,726	22,440	64,166	9.9	101	1,224	598	32.6	530	26.5	6,772	184	92.4
1923	39,826	20,833	60,659	6.3	72	1,120	523	30.9	450	24.4	5,430	185	79.6
Seaboard Air Line....1924	10,691	10,513	21,204	4.4	100	1,326	524	22.3	438	30.6	2,616	156	71.2
1923	11,039	10,121	21,160	12.6	100	1,226	457	21.5	378	29.0	2,249	164	69.6
Southern Ry. 1924	36,709	24,270	60,979	5.1	...	1,232	486	22.3	379	26.9	3,381	188	51.3
1923	36,342	28,391	64,733	3.3	...	1,195	486	22.3	345	24.4	3,215	198	48.9
Northwestern Region:													
Chic. & North Western....1924	49,132	28,556	77,688	10.0	7,740	1,179	469	22.7	287	20.1	2,642	185	47.9
1923	45,886	30,192	76,078	6.0	11,761	1,294	527	24.3	342	23.0	3,078	166	48.5
Chic., Milw. & St. P....1924	54,146	24,379	78,525	8.5	...	1,435	651	25.8	431	25.0	3,081	188	50.7
1923	50,893	26,587	77,480	6.2	6,300	1,410	637	25.7	436	25.9	3,077	170	49.8
Chic., St. P., Minn. & Om.1924	3,555	10,165	13,720	10.5	715	948	403	24.0	331	21.0	2,629	194	64.7
1923	3,626	10,329	13,955	7.2	2,076	1,012	417	23.0	307	20.5	2,483	174	54.5
Great Northern 1924	47,064	14,853	61,917	6.8	...	1,517	732	27.1	321	16.8	2,442	180	39.1
1923	45,268	10,495	55,763	6.1	...	1,542	718	26.2	323	17.5	2,181	165	37.0
M., St. P. & S. Ste. M...1924	20,942	6,559	27,501	4.5	918	1,106	514	23.7	324	18.8	2,040	149	52.5
1923	18,996	5,740	24,736	6.2	445	1,171	530	23.3	322	19.9	1,819	136	45.3
Northern Pacific 1924	35,167	12,503	47,670	6.2	...	1,502	715	26.5	413	21.6	3,066	156	43.8
1923	33,431	13,543	46,974	5.4	4,550	1,571	737	26.2	382	20.2	2,799	137	36.2
Oreg.-Wash. R. R. & Nav..1924	5,937	3,596	9,533	3.1	...	1,480	694	26.8	448	23.2	1,961	224	45.0
1923	6,992	5,055	12,047	2.8	...	1,368	646	26.7	331	17.0	1,827	243	43.1
Central Western Region:													
Atch., Top. & S. Fe (incl..1924	51,697	18,076	69,773	7.1	8,522	1,636	605	21.8	464	33.8	3,238	145	60.9
P. & S. F.)....1923	47,216	17,798	65,014	6.0	5,019	1,589	560	20.5	445	35.1	2,938	153	60.0
Chicago & Alton....1924	9,529	5,366	14,895	4.8	...	1,287	549	26.0	403	24.9	5,904	196	79.4
1923	9,080	6,489	15,569	4.4	1,500	1,389	614	27.8	395	24.2	6,081	172	67.2
Chic., Burl. & Quincy....1924	50,353	20,196	70,549	7.7	...	1,537	721	28.9	545	30.4	4,133	180	57.6
1923	48,238	22,652	70,890	5.8	...	1,569	717	27.7	520	30.2	3,956	176	54.7
Chic., Rock I. & Pacific...1924	33,092	23,947	57,039	10.4	7,086	1,188	487	22.6	370	25.3	2,786	191	59.8
1923	31,427	25,788	57,215	7.6	7,506	1,198	477	23.0	389	27.7	2,912	190	63.5
Denver & R. G. Wn....1924	12,516	4,188	16,704	5.2	3,474	1,327	634	28.3	301	15.7	1,962	248	37.8
1923	13,162	4,105	17,267	5.0	3,835	1,261	595	28.1	284	15.3	1,894	261	37.8
Oregon Short Line....1924	6,649	5,467	12,116	5.1	...	1,490	695	28.7	610	31.5	3,099	160	52.1
1923	7,769	6,007	13,776	3.5	...	1,381	638	27.9	523	27.8	3,047	167	53.4
Southern Pacific (Pacific 1924	28,950	24,775	53,725	6.5	5,050	1,624	665	24.3	500	31.5	3,162	152	53.2
System) 1923	24,324	28,240	52,564	4.9	1,668	1,564	595	23.5	546	38.8	3,409	161	70.0
Union Pacific....1924	19,312	8,585	27,897	12.2	...	1,682	731	23.0	746	43.5	5,670	159	56.0
1923	15,516	9,983	25,499	10.0	...	1,737	725	22.8	879	54.8	6,037	156	61.2
Southwestern Region:													
Gulf, Colo. & S. Fe....1924	8,872	6,550	15,422	3.3	886	1,704	725	25.3	480	30.2	3,901	131	76.8
1923	8,842	4,644	13,486	3.4	1,475	1,533	644	24.1	370	24.0	2,631	130	52.4
Mo.-Kans.-Tex. 1924	7,437	7,705	15,142	4.5	...	1,749	693	23.1	405	28.5	3,461	127	60.5
1923	8,484	7,462	15,946	5.0	3,606	1,740	665	22.3	338	25.5	2,992	129	41.4
Mo.-Kans.-Tex. of Tex....1924	332	14,570	14,902	8.6	...	1,446	555	22.5	302	22.6	3,344	142	69.2
1923	273	11,594	11,867	11.7	3,122	1,308	480	21.3	244	19.5	2,086	145	51.2
Missouri Pacific....1924	25,908	25,269	51,177	7.6	...	1,403	643	26.8	563	31.5	3,960	163	75.2
1923	26,253	23,006	49,259	7.2	...	1,420	615	25.3	466	29.1	3,145	158	63.2
St. Louis-San Francisco...1924	18,635	14,154	32,789	5.0	12	1,139	493	24.8	436	26.8	3,056	190	61.7
1923	18,544	13,652	32,196	5.2	...	1,103	454	24.4	371	24.9	2,548	191	54.8
Southern Pacific Lines (in 1924	8,905	18,092	26,997	6.2	2,353	1,276	523	23.8	392	25.8	2,851	136	74.3
Tex. and La.)[2]....1923	7,528	17,861	25,389	4.3	1,983	1,246	516	25.8	448	29.1	3,067	135	75.4
Texas & Pacific....1924	6,080	7,992	14,072	8.7	...	1,311	499	21.9	377	27.1	2,720	160	54.3
1923	5,045	8,112	13,157	7.4	...	1,285	473	21.2	354	27.6	2,385	157	48.7

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Association of Transportation and Car Accounting Officers.)—G. W. Covert, 431 South Dearborn St., Chicago, Ill.

Division III.—Traffic, J. Gottschalk, 143 Liberty St., New York.

Division IV.—Engineering, E. H. Fritch, 431 South Dearborn St., Chicago, Ill. Next annual meeting, March 10-12, 1925, Chicago. Exhibit March 9-12, by National Railway Appliances Association.

Construction and Maintenance Section.—E. H. Fritch.

Electric Section.—E. H. Fritch.

Signal Section (including former activities of the Railway Signal Association).—H. S. Balliet, 30 Vesey St., New York, N. Y. Annual meeting, March 12 and 13, 1925, Hotel Drake, Chicago.

Division V.—Mechanical (including former activities of the Master Car Builders' Association and the American Railway Master Mechanics' Association).—V. R. Hawthorne, 431 South Dearborn St., Chicago, Ill. Business meeting, June 16-18, 1925. No exhibit in 1925.

Equipment Painting Section (including former activities of the Master Car and Locomotive Painters' Association).—V. R. Hawthorne, 431 South Dearborn St., Chicago, Ill.

Division VI.—Purchases and Stores (including former activities of the Railway Storekeepers' Association).—W. J. Farrell, 30 Vesey St., New York, N. Y. Annual meeting, May 19-21, St. Louis, Mo.

Division VII.—Freight Claims (including former activities of the Freight Claim Association).—Lewis Pilcher, 431 South Dearborn St., Chicago, Ill. Annual meeting, May 25, 1925, Kansas City, Mo.

Car Service Division—C. A. Buch, 17th and H Sts., N. W., Washington, D. C.

AMERICAN RAILWAY BRIDGE AND BUILDING ASSOCIATION.—C. A. Lichty, C. & N. W. Ry., 319 N. Waller Ave., Chicago. Next convention, October 20-22, 1925, Buffalo, N. Y. Exhibit by Bridge and Building Supply Men's Association.

AMERICAN RAILWAY DEVELOPMENT ASSOCIATION.—A. L. Moorshead, Industrial Engineer, Erie R. R., New York, N. Y. Next meeting, May 13-15, 1925, San Antonio, Texas.

AMERICAN RAILWAY ENGINEERING ASSOCIATION.—(Works in co-operation with the American Railway Association Division IV.) E. H. Fritch, 431 South Dearborn St., Chicago. Annual meeting, March 10-12, 1925, Chicago. Exhibit by National Railway Appliances Association.

AMERICAN RAILWAY MASTER MECHANICS' ASSOCIATION.—(See American Railway Association, Division V.)

AMERICAN RAILWAY TOOL FOREMEN'S ASSOCIATION.—G. G. Macina, C. M. & St. P. Ry., 11402 Calumet Ave., Chicago. Annual convention, August, 1925, Hotel Sherman, Chicago. Exhibit by Supply Association of the American Railway Tool Foremen's Association.

AMERICAN SHORT LINE RAILROAD ASSOCIATION.—T. F. Whittelsey, 1319-21 F St., N. W., Washington, D. C.

AMERICAN SOCIETY FOR STEEL TREATING.—W. H. Eisenman, 4600 Prospect Ave., Cleveland, Ohio.

AMERICAN SOCIETY FOR TESTING MATERIALS.—C. L. Warwick, 1315 Spruce St., Philadelphia, Pa. Annual meeting, June 22-26, Chalfonte-Haddon Hall, Atlantic City, N. J.

AMERICAN SOCIETY OF CIVIL ENGINEERS.—33 W. 39th St., New York. Regular meetings 1st and 3rd Wednesday in month, except July and August, 33 W. 39th St., New York.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS.—Calvin W. Rice, 29 W. 39th St., New York. Railroad Division, A. F. Stuebing, Chief Engineer, Bradford Draft Gear Co., 23 W. 43rd St., New York.

AMERICAN TRAIN DISPATCHERS' ASSOCIATION.—C. L. Darling, 10 East Huron St., Chicago, Ill. Biennial convention, July 20, 1925, Chicago.

AMERICAN WOOD PRESERVERS' ASSOCIATION.—P. R. Hicks, Room 1146, Otis Bldg., Chicago.

ASSOCIATION OF RAILWAY CLAIM AGENTS.—H. D. Morris, District Claim Agent, Northern Pacific Ry., St. Paul, Minn. Annual meeting, June 17, 1925, Winnipeg, Canada.

ASSOCIATION OF RAILWAY ELECTRICAL ENGINEERS.—Jos. A. Andreucetti, C. & N. W., Room 411, C. & N. W. Sta., Chicago. Annual meeting, October 20-24, Hotel Sherman, Chicago. Exhibit by Railway Electrical Supply Manufacturers' Association.

ASSOCIATION OF RAILWAY EXECUTIVES.—Stanley J. Strong, 17th and H Sts., N. W., Washington, D. C.

ASSOCIATION OF RAILWAY SUPPLY MEN.—E. E. Thulin, Peoples Gas Bldg., Chicago. Meeting with International Railway General Foremen's Association.

ASSOCIATION OF RAILWAY TELEGRAPH SUPERINTENDENTS.—(See American Railway Association, Division I.)

ASSOCIATION OF TRANSPORTATION AND CAR ACCOUNTING OFFICERS.—(See American Railway Association, Division II.)

BRIDGE AND BUILDING SUPPLY MEN'S ASSOCIATION.—B. J. Wilson, Pocket List of Railroad Officials, 605 Fisher Building, Chicago. Meeting with American Railway Bridge and Building Association.

CANADIAN RAILWAY CLUB.—C. R. Crook, 129 Charron St., Montreal, Que.

CAR FOREMEN'S ASSOCIATION OF CHICAGO.—Aaron Kline, 626 North Pine Ave., Chicago. Regular meetings, 2nd Monday in month, except June, July and August, Great Northern Hotel, Chicago.

CAR FOREMEN'S ASSOCIATION OF ST. LOUIS, MO.—R. E. Giger, 721 North 23rd St., East St. Louis, Ill. Meetings, first Tuesday in month at the American Hotel Annex, St. Louis.

CENTRAL RAILWAY CLUB.—Harry D. Vought, 26 Cortlandt St., New York. Regular meetings, 2nd Thursday, January to November. Interim meetings, 2nd Thursday, February, April, June, Hotel Statler, Buffalo, N. Y.

CHICAGO CLAIM CONFERENCE, Personal Injury Section.—F. L. Johnson, Chicago & Alton R. R., 340 Harrison St., Chicago. Meets 12:30 p. m., first Monday each month, Sherman Hotel, Chicago.

CHIEF INTERCHANGE CAR INSPECTORS' AND CAR FOREMEN'S ASSOCIATION.—A. S. Sternberg, Belt Ry. of Chicago, Polk and Dearborn Sts., Chicago.

CHIEF INTERCHANGE CAR INSPECTORS' AND CAR FOREMEN'S SUPPLY MEN'S ASSOCIATION.—Bradley S. Johnson, W. H. Miner, Rookery Bldg., Chicago, Ill. Meeting with Chief Interchange Car Inspectors' and Car Foremen's Association.

CINCINNATI RAILROAD CLUB.—W. C. Cooder, Union Central Bldg., Cincinnati, Ohio. Meetings, 2nd Tuesday in February, May, September and November.

CLEVELAND STEAM RAILWAY CLUB.—F. L. Frericks, 14416 Alder Ave., Cleveland, Ohio. Meetings, first Monday each month, Hotel Cleveland, Public Square, Cleveland.

EASTERN RAILROAD ASSOCIATION.—E. N. Bessling, 614 F St., N. W., Washington, D. C. Annual meeting, May 14, 1925, Railroad Club, New York.

FREIGHT CLAIM ASSOCIATION.—(See American Railway Association, Division VII.)

GENERAL SUPERINTENDENTS' ASSOCIATION OF CHICAGO.—C. H. Treichel, Grand Central Station, Chicago. Regular meetings, Wednesdays, preceding 3rd Friday in month, Room 1414, Manhattan Bldg., Chicago.

INTERNATIONAL RAILROAD MASTER BLACKSMITHS' ASSOCIATION.—W. J. Mayer, Michigan Central R. R., Detroit, Mich. Next meeting, August 18-20, 1925, Hotel Winton, Cleveland, O. Exhibit by International Railroad Master Blacksmiths' Supply Men's Association.

INTERNATIONAL RAILWAY CONGRESS.—Office of Permanent Commission of the Association, 17 rue de Louvain, Brussels, Belgium. General secretary, M. Ghilain. Next session of the Congress, London, June 22-July 6.

INTERNATIONAL RAILWAY FUEL ASSOCIATION.—J. B. Hutchison, 6000 Michigan Ave., Chicago. Next annual convention, May 26-29, 1925, Hotel Sherman, Chicago. Exhibit by International Railway Supply Men's Association.

INTERNATIONAL RAILWAY GENERAL FOREMEN'S ASSOCIATION.—Wm. Hall, 1061 W. Wabash Ave., Winona, Minn. Annual convention, September 8-11, 1925, Hotel Sherman, Chicago.

INTERNATIONAL RAILWAY SUPPLY MEN'S ASSOCIATION.—F. S. Wilcoxen, The Edna Brass Manufacturing Company, 460 McCormick Bldg., Chicago, Ill. Meeting with International Railway Fuel Association.

MASTER BOILER MAKERS' ASSOCIATION.—Harry D. Vought, 26 Cortlandt St., New York. Next convention, May 19-22, 1925, Hotel Sherman, Chicago.

MASTER CAR AND LOCOMOTIVE PAINTERS' ASSOCIATION.—(See A. R. A., Division V.)

MASTER CAR BUILDERS' ASSOCIATION.—(See A. R. A., Division V.)

MOBILE TRAFFIC & TRANSPORTATION CLUB.—T. C. Schley, 71 Conti St., Mobile, Ala. Regular dinner meetings, 6 p. m. on 2nd Thursday of each month, Cawthon Vineyard, Mobile, Ala.

NATIONAL ASSOCIATION OF RAILWAY TIE PRODUCERS.—J. S. Penney, T. J. Moss Tie Company, St. Louis, Mo. Next convention, 1925, Chicago.

NATIONAL ASSOCIATION OF RAILROAD AND UTILITIES COMMISSIONERS.—James B. Walker, 49 Lafayette St., New York.

NATIONAL FOREIGN TRADE COUNCIL.—O. K. Davis, 1 Hanover Square, New York.

NATIONAL HIGHWAY TRAFFIC ASSOCIATION.—Elmer Thompson, 12 East 53rd St., New York.

NATIONAL RAILWAY APPLIANCES ASSOCIATION.—C. W. Kelly, 825 South Wabash Ave., Chicago. Annual exhibition at convention of American Railway Engineering Association. Exhibit March 9-12, 1925, incl.

NATIONAL SAFETY COUNCIL.—Steam Railroad Section: E. R. Cott, Safety Agent, Hocking Valley Ry., Columbus, Ohio.

NEW ENGLAND RAILROAD CLUB.—W. E. Cade, Jr., 683 Atlantic Ave., Boston, Mass. Regular meetings, 2nd Tuesday in month, excepting June, July, August and September, Copley-Plaza Hotel, Boston, Mass.

NEW YORK RAILROAD CLUB.—Harry D. Vought, 26 Cortlandt St., New York. Regular meetings, 3rd Friday in month, except June, July and August, at 29 W. 39th St., New York.

PACIFIC RAILWAY CLUB.—W. S. Wollner, 64 Pine St., San Francisco, Cal. Regular meetings, 2nd Thursday in month, alternately in San Francisco and Oakland.

RAILWAY ACCOUNTING OFFICERS' ASSOCIATION.—E. R. Woodson, 1116 Woodward Building, Washington, D. C. Annual meeting, June 10, 1925, Hotel Traymore, Atlantic City, N. J.

RAILWAY BUSINESS ASSOCIATION.—Frank W. Noxon, 600 Liberty Bldg., Broad and Chestnut Sts., Philadelphia, Pa.

RAILWAY CAR MANUFACTURERS' ASSOCIATION.—W. C. Tabbert, 61 Broadway, New York.

RAILWAY CLUB OF PITTSBURGH.—J. D. Conway, 515 Grandview Ave., Pittsburgh, Pa. Regular meetings, 4th Thursday in month, except June, July and August, Fort Pitt Hotel, Pitsburgh, Pa.

RAILWAY DEVELOPMENT ASSOCIATION.—(See Am. Ry. Development Assn.)

RAILWAY ELECTRICAL SUPPLY MANUFACTURERS' ASSOCIATION.—Edward Wray, 9 S. Clinton St., Chicago. Annual meeting with Association of Railway Electrical Engineers.

RAILWAY EQUIPMENT MANUFACTURERS' ASSOCIATION.—Joseph Sinkler, Pilot Packing Co., Peoples Gas Bldg., Chicago. Meeting with Traveling Engineers' Association.

RAILWAY FIRE PROTECTION ASSOCIATION.—R. R. Hackett, Baltimore & Ohio R. R., Baltimore, Md.

RAILWAY REAL ESTATE ASSOCIATION.—C. C. Marlor, Room 1143, Transportation Building, Chicago.

RAILWAY SIGNAL ASSOCIATION.—(See A. R. A., Division IV., Signal Section.)

RAILWAY STOREKEEPERS' ASSOCIATION.—(See A. R. A., Division VI.)

RAILWAY SUPPLY MANUFACTURERS' ASSOCIATION.—J. D. Conway, 1841 Oliver Bldg., Pittsburgh, Pa. Meets with Mechanical Division, A. R. A. No exhibit in 1925.

RAILWAY TELEGRAPH AND TELEPHONE APPLIANCE ASSOCIATION.—G. A. Nelson, 30 Church St., New York. Meets with Telegraph and Telephone Section of A. R. A., Division I.

RAILWAY TREASURY OFFICERS' ASSOCIATION.—L. W. Cox, Commercial Trust Bldg., Philadelphia, Pa.

ROADMASTERS' AND MAINTENANCE OF WAY ASSOCIATION.—P. J. McAndrews, C. & N. W. Ry., Sterling, Ill. Next convention, September 22-24, 1925, Kansas City, Mo. Exhibit by Track Supply Association.

ST. LOUIS RAILWAY CLUB.—B. W. Frauenthal, Union Station, St. Louis, Mo. Regular meetings, 2nd Friday in month, except June, July and August.

SIGNAL APPLIANCE ASSOCIATION.—F. W. Edmunds, Sunbeam Electric Manufacturing Company, New York City. Meeting with American Railway Association, Signal Section.

SOUTHEASTERN CARMEN'S INTERCHANGE ASSOCIATION.—J. E. Rubley, Southern Railway Shop, Atlanta, Ga. Meets semi-annually.

SOUTHERN AND SOUTHWESTERN RAILWAY CLUB.—A. T. Miller, P. O. Box 1205, Atlanta, Ga. Regular meetings, 3rd Thursday in January, March, May, July, September and November, Piedmont Hotel, Atlanta.

SOUTHERN ASSOCIATION OF CAR SERVICE OFFICERS.—J. L. Carrier, Car. Serv. Agent, Tenn. Cent. Ry., 319 Seventh Ave., North Nashville, Tenn.

SUPPLY ASSOCIATION OF AMERICAN RAILWAY TOOL FOREMEN'S ASSOCIATION.—H. S. White, 9 N. Jefferson St., Chicago.

TRACK SUPPLY ASSOCIATION.—W. C. Kidd, Ramapo-Ajax Corporation, Hillburn, N. Y. Meets with Roadmasters' and Maintenance of Way Association.

TRAVELING ENGINEERS' ASSOCIATION.—W. O. Thompson, 1177 East 98th St., Cleveland, Ohio. Annual meeting, September 15-18, 1925, Chicago. Exhibit by Railway Equipment Manufacturers' Association.

WESTERN RAILWAY CLUB.—Bruce V. Crandall, 226 West Jackson Boulevard, Room 1001, Chicago. Annual meeting, May 23, Edgewater Beach Hotel, Chicago. Regular meetings, 3rd Monday each month, except June, July and August.

WESTERN SOCIETY OF ENGINEERS.—Edgar S. Nethercut, 1735 Monadnock Block, Chicago, Ill.

Traffic News

The Interstate Commerce Commission and the Illinois Commerce Commission on February 18 suspended proposed new freight rates on coal from Illinois, Indiana and western Kentucky to points in Wisconsin and Minnesota, pending a hearing on the proposed changes within the next 60 days.

Total loadings of revenue freight on the Missouri Pacific during February were 120,930 cars which was a gain of 10,245 cars or 9.4 per cent over February, 1924. Local loadings exceeded last year's figure by 9,032 cars. The average daily total loadings were 5,258 carloads this year compared with 4,608 in 1924. The average mileage per car per day was 36.25 compared with 35.61 in January and was more than 5½ miles above February, 1924. Passenger trains maintained a 96.7 per cent on time record. Total loadings of revenue freight on the International-Great Northern for the month were 18,739 cars as compared with 16,518 last year, while on the Gulf Coast Lines they were 16,737 in 1925 and 13,774 in 1924.

Summary of Freight Traffic for 1924

Freight traffic on Class I railroads of the United States during 1924 amounted to 429,453,224,000 net ton miles, according to reports compiled by the Bureau of Railway Economics. This was a decrease of 6.2 per cent as compared with 1923, and 4 per cent as compared with 1920. In the Eastern district the total for 1924 was 9.8 per cent under that for 1923; in the Southern district 4.0 per cent, and in the Western district 1.5 per cent under.

Freight traffic during the first three months and the last three months of 1924 was the heaviest ever reported for any corresponding period but there was a falling off during the intervening six months.

In 1924 the railroads established the following records:

They handled the greatest freight traffic for any one month in history in October, 43,109,743,000 net ton miles, exceeding by about one per cent the previous record made in August, 1920. They handled during the year the greatest amount of grain and grain products ever offered to them, 2,575,000 cars, an increase of 4.8 per cent over the previous record made in 1922. They also handled the greatest loading of miscellaneous freight during the year ever reported for any corresponding period.

For the month of December, freight traffic amounted to 34,997,781,000 net ton miles, which was an increase of 4.7 per cent over December, 1923.

Crow's Nest Agreement Upheld

The Supreme Court of Canada in the appeal of the three Prairie provinces against the ruling of the Dominion Railway Board last October setting aside the Crow's Nest Pass Agreement as a factor in Canadian freight rates has decided against the Board. It ruled that the Railway Board cannot fix rates higher than the maximum provided for in the agreement, but that those rates shall apply only to the lines of the Canadian Pacific Railway in existence in 1897 when the agreement first became effective. It also affects the Canadian National Railways which have had to apply the Crow's Nest rates to competitive points.

On February 26 the text of the judgment was tabled in the House of Commons by George P. Graham, Minister of Railways and Canals, who at the request of Mr. Meighen, leader of the Conservatives, read to the House a summary of its findings. Then W. F. Maclean, one of the Conservative members from Toronto, asked the Minister if the government contemplated referring the question to the Privy Council in London, Eng., to which Ernest Lapointe, Minister of Justice, said he could make no reply, intimating that it would remain for the parties to the litigation to decide that. It is certain, though, that there will be no such appeal for the simple reason that the whole question has now to be settled by Parliament.

As the Crow's Nest rates, by the Supreme Court judgment, will be confined to the 1897 lines the same discrimination as between towns and cities and as between districts, as followed the railways' narrow application of the agreement on July 7 last, will be continued, and it is this discrimination that almost every section of Canada is now calling upon the federal Parliament to remove. The Liberal government has promised to bring in a scheme of equalization of freight rates, and that plan will be embodied in a bill to be introduced in the House of Commons by Mr. Graham.

The questions submitted to the Supreme Court and the answer of the court thereto, are as follows:

Question No. 1.—Whether, as a matter of law, the Board (of Railway Commissioners) is empowered, under the jurisdiction conferred upon it by the Railway Act, or otherwise, to authorize railway rates upon the Canadian Pacific in excess of the maximum rates referred to in the Crow's Nest Pass Act and the agreement therein referred to, upon the commodities therein mentioned.

Answer of the Supreme Court—No.

Question No. 2.—If the court shall be of the opinion that the Crow's Nest Pass Act or agreement is binding upon the Board of Railway Commissioners for Canada, then, according to the construction of the Crow's Nest Pass Act, section 1, clause D, and the agreement made thereunder.

Are the rates therein provided applicable to traffic westbound from Fort William and from all points east of Fort William now on the Canadian Pacific?

Answer of the court—No.

Are such rates confined to westbound traffic originating at Fort William and at such points east of Fort William as were, at the date of the passing of the Act, and (or) the making of the agreement on the company's line?

Answer of the court—Yes.

Are such rates applicable to traffic originating at points east of Fort William, which were at the date of the passing of the Act, and (or) of the making of the agreement on any line of railway owned or leased by or operated on account of the Canadian Pacific?

Answer of the court—In order that the traffic provided for by clause D should fall under that clause, it must originate at Fort William or some point east thereof, which at the date of the agreement was "on the company's railway."

Are the rates therein provided applicable to traffic destined to points west of Fort William, which are now on the Canadian Pacific or on any line of railway owned or leased by or operated on account of the Canadian Pacific?

Answer of the court—In order that the rates prescribed in clause D should apply, the destination of traffic otherwise within that clause must be a point which was, at the date of the agreement, "on the company's main line or on (some) line of railway throughout Canada owned by or operated on account of the company."

Are such rates confined to traffic destined to points west of Fort William, which were, at the date of the passing of the Act or the making of the agreement, on the Canadian Pacific, or on any line of railway owned or leased by or operated on account of the Canadian Pacific?

Answer of the court—Yes.

Question No. 3.—Whether, as a matter of law, the board is empowered, under the jurisdiction conferred upon it by the Railway Act or otherwise, to authorize rates upon the Canadian Pacific on grain and flour from all points on the main line, branches, or connections with the company west of Fort William, to Fort William and Port Arthur, and all points east beyond the maximum rates specified in the Crow's Nest Pass Act and agreement?

Answer of the court—No.

The formal judgment of the court reads in part:

"As to question No. 1 and three: Appeal allowed. The maximum rates provided by clauses D and E (Sec. 1 Crow's Nest Pass Act) are declared binding on the Board of Railway Commissioners of Canada.

"As to question No. 2: Appeal dismissed. The application of the maximum rates provided in clause D is declared to be restricted to westbound traffic in the commodities specified, originating from Fort William or some point east thereof, which was on the sixth of September, 1897, on the company's railway and destined for some point west of Fort William, which was on the sixth of September, 1897, on the company's main line, or on any line of railway throughout Canada owned or leased by or operated on account of the company."

Labor News

The Chicago, Rock Island & Pacific has granted wage increases of approximately 6 per cent to its engineers and firemen, represented by the Brotherhood of Locomotive Engineers and the Brotherhood of Locomotive Firemen and Enginemen. The increases correspond to those made by virtually all the western roads under the so-called "Southern Pacific agreement" which provided wage increases without changes in important working rules. Early last fall the Rock Island signed an agreement with its engineers for the continuance for one year of the wages and working rules then in effect. The present wage increase was granted in spite of this in order to keep the wage rates of its engineers and firemen in line with those of the engine service employees of other western roads.

Wage Statistics for December, 1924

The total number of employees reported by Class I railroads for the month of December, 1924, was the lowest since September, 1922, according to the Interstate Commerce Commission's monthly bulletin of wage statistics. The total number reported was 1,736,699, a decrease of 52,024 or 2.9 per cent as compared with the returns for November, 1924. Seasonal reduction in the maintenance of way and structures forces was the principal cause of the decrease. The total compensation, however, shows an increase of $4,285,529 or 1.8 per cent. This increase in compensation is due partly to the fact that December had 26 working days while November had only 23. Compared with the returns for the corresponding month last year the employment shows a decrease of 3.2 per cent and the total compensation an increase of 2.4 per cent.

The monthly earnings, by groups, were as follows:

	Monthly earnings of—			
	Employees reported on daily basis		Employees reported on hourly basis	
Group	December, 1924	December, 1923	December, 1924	December, 1923
Executives, officials and staff assistants	$437	$429	...	...
Professional, clerical and general	183	181	$126	$123
Maintenance of way and structures	241	240	89	86
Maintenance of equipment and stores	246	244	124	117
Transportation (other than train, engine and yard)	99	97	125	122
Transportation (yardmasters, switch tenders and hostlers)	258	252	157	147
Transportation (train and engine service)	...	...	199	180

Labor Unions Lose Case Against Pennsylvania

The right of the Pennsylvania to refuse to comply with orders of the Railroad Labor Board regarding the method of selecting representatives of its employees to serve on committees to deal with the management, and to refuse to recognize as such representatives officers of unions not employees of the company, was sustained in a decision rendered by the Supreme Court on March 2 in two cases in which the unions had sought injunctions to force the railroad to comply with the board's orders. The suits were instituted by the Pennsylvania Railroad System and Allied Lines Federation No. 90 and the Pennsylvania System Board of Adjustment of the Brotherhood of Railway and Steamship Clerks, Freight Handlers, Express and Station Employees. Plaintiffs also charged conspiracy on the part of the railroad in refusing to deal with them as representatives of the employees. In his decision Chief Justice Taft quoted at length from the earlier decision of the court relating to the powers of the Labor Board, and said that there is nothing compulsory in the provisions of the transportation act, creating the board, upon the basis of which either the company or the employees acquire additional rights against the other which can be enforced in a court of law. Nothing can be found in the act, he said, to indicate that Congress had in mind or intended that railroad companies and their employees "were in any way to be forced into compliance with the statute or with the judgments pronounced by the Labor Board, except through the effect of adverse public opinion." Remedy by a court injunction was never intended by Congress.

Foreign Railway News

Railway Improvement Plans in Germany

LONDON.

As a result of the contribution to be made by the German railways to reparations under the Dawes plan, a great reorganization of the material, personnel, and service has been put in hand. Herr Oeser, formerly Minister of Communications, and now Director of the German Reich Railway Company, has recently made public some details of the reforms and the prospects of improvement, both in the service and the railway finances, which may be expected in the near future.

Bearing in mind the fact that the railways will have to raise 200,000,000 gold marks for payment into the reparations account this year, 595,000,000 next year, thereafter about a billion gold marks yearly, and will have to form a reserve fund of 100,000,000 marks, the first endeavor has naturally been to place them on a paying basis. A comparison of the present railway rates with those obtaining before the war is difficult, because the classification of freight has been altered, the zone system changed, and traffic taxation imposed. It is estimated, however, that the present passenger rates are 130 to 135 per cent higher than the pre-war rates. The passenger traffic still shows a deficit in relation to operating costs.

The prices paid for material, maintenance and operating costs are all materially higher than before the war. Coal is calculated to be 140 per cent dearer, lubricating oil 153, copper 160, steel 140, paint 200, and textiles 175 per cent dearer. It will be seen, therefore, that rates have not been raised in proportion to the general rise in costs of materials. The personnel has been reduced by 300,000, but the charges under this head are still relatively high. The average of wages per head in 1913 was 1,588 marks, and in 1925 it is 2,243 marks. The number of railway workers employed during the present year is estimated at 770,000, as compared with 692,700 in 1913.

Under the former administration the railway workshops were run in an exceedingly wasteful and inefficient manner. No attempt was made at standardization. Scientific methods have now been introduced and the work systematized, with very good results. During the war the average period for the repair of a locomotive was 108 days. By the application of modern methods this has been reduced to between 30 and 40 days for the same repair. The ravages of the war upon plant have not yet been completely made up, especially as regards bridges and permanent way. During 1925 a number of bridges are to be rebuilt and some 1,800 miles of track relaid. Passenger cars are to be re-decorated and looking-glasses fitted in. Herr Oeser even holds out a hope that soap and towels will be supplied on the through expresses "provided that the public has learned something in the meantime." All long distance trains are to be fitted with electric lights. This is doubtless as a result of the terrible lesson of the Bellinzona accident, when the German gas-lit section set fire to the Italian express. Telephones are to be introduced on the Berlin-Hamburg, Berlin-Cologne, and Berlin-Frankfurt expresses.

Germany is now running 65 per cent of the number of fast trains run in 1913. During the coming summer it is hoped to put on a Hamburg-Berlin express at 45 miles per hour, and a Berlin-Cologne express at slightly less than 45 miles per hour.

Miscellaneous Notes

The Persian government will purchase locomotives for the Tabriz-Julfa Railway.

The Bureau of Foreign and Domestic Commerce has received the following items from its agents abroad:

The Nitrate Railways of Chile are using all available rolling stock and will have to order more in the near future if business continues good.

The Egyptian State Railways will receive tenders up to March 12 for 500 steel covered goods wagons and 130 goods brake vans. Tenders will soon be invited for 400 open goods wagons, 40 steel underframes and 80 trucks for passenger cars, 75 steel third-class passenger cars and 35 Atlantic type locomotives.

Equipment and Supplies

Locomotives

THE ATLANTIC COAST LINE is inquiring for 10 Pacific type and 15, 2-10-2 type locomotives.

THE READING COMPANY is inquiring for 5 switching locomotives. This item has not as yet been officially confirmed.

Freight Cars

THE DELAWARE, LACKAWANNA & WESTERN is inquiring for 300 refrigerator cars.

THE MISSOURI PACIFIC is inquiring for 2,250 underframes for gondola cars and 250 underframes for box cars.

THE VACUUM OIL COMPANY has ordered 4 steel hopper cars of 55 tons' capacity, from the American Car & Foundry Company.

THE CENTRAL VERMONT has ordered 12 steel underframes for caboose cars and 20 steel underframes for refrigerator milk cars from the American Car & Foundry Company.

THE QUAKER CITY TANK LINE ordered 200 tank cars from the Standard Tank Car Company. This is in addition to the order for 200 cars reported in the *Railway Age* of February 21.

THE CHARLESTON & WESTERN CAROLINA has ordered 100 box cars from the Tennessee Coal, Iron & Railroad Company. Inquiry for this equipment was reported in the *Railway Age* of January 17.

THE CHICAGO, INDIANAPOLIS & LOUISVILLE has ordered 250 hopper cars and 500 box cars from the Pullman Car & Manufacturing Corporation. Inquiry for this equipment was reported in the *Railway Age* of January 10 and February 7.

THE SLOSS-SHEFFIELD STEEL & IRON COMPANY has ordered 75 hopper cars of 55 tons' capacity and 35 steel gondola cars of 55 tons' capacity from the Tennessee Coal, Iron & Railroad Company. Inquiry for this equipment was reported in the *Railway Age* of February 14.

THE CANADIAN PACIFIC was incorrectly reported in the *Railway Age* of February 21 as inquiring for prices on the repair of 1,200 cars. A representative of the road advises that the Canadian Pacific does not contract for the repair of cars outside the company's own shops and does not contemplate doing so in future.

Passenger Cars

THE PENNSYLVANIA has ordered one combination passenger and baggage Brill Model 75 gasoline motor car, from the J. G. Brill Company.

THE TENNESSEE, ALABAMA & GEORGIA has ordered one combination passenger and baggage Brill Model 75 gasoline motor car, from the J. G. Brill Company.

THE NEW YORK CENTRAL inquiry for passenger cars reported in the *Railway Age* of February 28 includes 10 to 20 steel coaches 70 ft. long; 25 steel baggage cars 60 ft. 6 in. long; 10 steel dining cars 73 ft. 6 in. long; 5 steel baggage cars 69 ft. 3 in. long, and 10 steel suburban passenger coaches 70 ft. 4 in. long.

Iron and Steel

THE ILLINOIS CENTRAL is inquiring for 440 tons of plate girder spans.

THE CHICAGO & NORTH WESTERN is inquiring for 3,000 tons of structural steel for bridge work.

THE NORFOLK & WESTERN has ordered 300 tons of steel for bridges from the American Bridge Company.

THE HAVANA CENTRAL has ordered 2,500 tons of 80-lb. rail from the United States Steel Products Company.

THE CHICAGO & WESTERN INDIANA has placed an order for 4,000 tons of rails with the Illinois Steel Company.

THE WABASH has divided an order for 10,000 tons of rails among the Illinois Steel Company, the Inland Steel Company and the Bethlehem Steel Corporation.

THE FLORIDA EAST COAST has ordered 16,300 tons of 90-lb. rail from the Tennessee Coal, Iron & Railroad Company. An order has also been given for about 700 tons of steel to the Phoenix Bridge Company for use on 3 plate girder bridges and 2 lift bridges.

Machinery and Tools

THE NEW YORK CENTRAL has placed an order for a 44-in. side-head boring mill.

THE UNION TANK CAR COMPANY has placed orders for an axle lathe, a car wheel borer and a 300-ton wheel press.

THE DELAWARE, LACKAWANNA & WESTERN is inquiring for 19 machine tools.

THE CHICAGO, ROCK ISLAND & PACIFIC is inquiring for two 100-in. locomotive pin turning and wheel quartering machines, one 40-in. by 48-in. by 14-ft. heavy duty planer, one 18-in. upright light duty drill press, one 15-in. light duty lathe, one plate bending roll, two belt-driven locomotive driving box and rod bushing presses and one flanging press.

THE ILLINOIS CENTRAL is inquiring for one 96-in., 600-ton capacity driving wheel press, 8 grinding machines, one tube cutter, one 7-ft. by 3/8 in. bending roll, one 10-ft. pneumatic boiler shop flanging clamp, one 4-in. bar shear, one heavy-duty boiler shop double end punch and shear, one 2¼ by 24 in. turret lathe, one 3 by 36 in. turret lathe, one No. 5 knee type milling machine, one 18-in. turret brass lathe, and one 36-in. vertical turret lathe.

Signaling

THE FLORIDA EAST COAST has contracted with the General Railway Signal Company for the installation of interlockings at drawbridges over the West Palm Beach Canal at Canal Port, Fla.; at Fort Lauderdale, at Jupiter and at Stuart. Color-light home signals will be installed at all of these plants, and at Canal Port there will be color-light distant signals also; but at the other bridges the distant signal will be a motionless semaphore. Model 2A smash boards will be used at all of the bridges.

THE AVERAGE MILES per car per day on the Gulf, Mobile & Northern has increased from 9.9 to 31.2 during the last five years. In 1919 it was 9.9, in 1920 it was 16.4, in 1921 it was 16.9, in 1922 it was 20.6, in 1923 it was 27.7 and in 1924 it was 31.2.

FREIGHT CAR REPAIR SITUATION

1924	Number freight cars on line	Cars awaiting repairs: Heavy	Light	Total	Per cent of cars awaiting repairs
January 1	2,279,363	118,653	39,522	158,175	6.9
April 1	2,274,750	125,932	46,815	172,747	7.6
July 1	2,279,826	144,912	49,957	194,869	8.5
October 1	2,304,020	157,455	48,589	206,044	8.9
January 1	2,293,487	143,962	47,017	190,979	8.3
February 1	2,305,520	139,056	47,483	186,539	8.1

Month	Cars repaired: Heavy	Light	Total
December	87,758	2,073,280	2,161,038
March	77,365	2,213,158	2,290,523
June	70,480	1,888,899	1,959,379
September	74,295	1,372,277	1,446,572
December	66,615	1,288,635	1,355,250
January, 1925	69,084	1,358,308	1,427,392

Data from Car Service Division reports.

Supply Trade News

B. H. Whiting, vice-president and general manager of the **Whiting Corporation,** Harvey, Ill., has resigned.

The Crane Company, Chicago, has purchased the former station of the Atchison, Topeka & Santa Fe at Phoenix, Ariz., and will erect an office building and warehouse to cost $500,000.

The General American Tank Car Corporation and the **General American Car Company** have moved their general offices from the Harris Trust building to the Illinois Mechants Bank building, Chicago.

E. P. McGann, of the manufacturing department of the Pullman Company, and **George C. Jerome,** have been appointed railroad sales representatives of the **Central Electric Company,** Chicago.

H. F. Welch, in charge of railroad sales of the **Niles-Bement-Pond Company,** New York, has been appointed sales manager of the New York district. Mr. Welch will also continue to perform his former duties.

Arthur E. Bendelari, who has been in charge of operations in Missouri and Oklahoma for the **Eagle-Picher Lead Company,** has been appointed vice-president and treasurer to succeed Thomas R. Brown, Jr., retired.

The Whiting Corporation, Harvey, Ill., has appointed new sales agents as follows: **Snyder Foundry Supply Company,** Los Angeles, Cal.; **S. G. Elbe, Inc.,** 211 Tramway building, Denver, Colo.; **Edward S. King,** 306 Elmhurst building, Kansas City, Mo.

The Welding Service & Sales Company, Donovan building, Detroit, Mich., of which **T. M. Butler** is manager, has been appointed agent in the Detroit territory for the **Gibb Welding Machines Company,** Bay City, Mich., for its arc, spot and seam welding machines.

Bradford H. Whiting, vice-president and general manager of the Whiting Corporation, Harvey, Ill., and president of its subsidiary, the Grindle Fuel Equipment Company, on account of ill health has resigned and severed his connections with these companies. Mr. Whiting has also given up his directorship in both companies.

The Morton Manufacturing Company, Chicago, has appointed the **Crowe-Matthews Company,** 212 Douglas building, Seattle, Wash., and 1177 Dock street, Tacoma, Wash., its exclusive and direct representative covering the sale of Acme line of railway appliances in the northwestern section of the United States.

R. I. Fretz has been placed in charge of marketing boiler tubes for the **Reading Iron Company,** Reading, Pa. Mr. Fretz formerly represented the Bethlehem Steel Company and the Midvale Steel & Ordnance Company for a number of years. He has been a student of metallurgy and metallography and spent some time in the Reading Iron Company's plant with a view to securing a working knowledge of its methods.

Worthington Pump & Machinery Corporation

The Worthington Pump & Machinery Corporation reports gross sales for the year 1924 of $16,572,066, against $21,142,264 in 1923, and net operating profit of $1,067,195, against $1,597,666 the year before. After crediting other income and allowing for interest and other charges, the company reports net income of $1,177,779 for the year, against net income of $1,670,850 reported in 1923.

The net income for last year, after allowing for dividends on both classes of preferred stock, was equal to $1.28 a share earned on the $12,992,149 common stock outstanding, against $5.21 a share earned on the common stock, after preferred dividends, in 1923.

C. Philip Coleman, president of the company, in his statement to stockholders said in part:

"The development and engineering research work necessary to broadening of the corporation's market have shown increasingly substantial results. Thirty per cent of the year's bookings have been in the improved lines of standard product resulting from this development work. The four-cycle air-injection vertical Diesel engine has justified itself both in performance and in profit, and there is a distinctly increasing demand for Diesel oil engines in all of the several types manufactured by the corporation.

"Progress has been made in the further introduction of the locomotive feed water heater. Due to the decrease in locomotive purchases during the year the volume of business did not increase, but there was an increase in the number of railroads using the device. The heater is now in service on forty-three American, and forty-eight foreign railroads. The reported tests have been satisfactory, and on a number of railroads it has become a standard installation.

"The use of the heater assures a saving of about 15 per cent in fuel consumed, an increase in boiler steaming capacity and a decrease in the cost of boiler maintenance. The proved economies resulting from locomotive feed water heating assures increasing use by the railroads, and should result in a further increase in the sales of this line. The expenditures incident to these several lines of development have been almost wholly charged against current earnings."

Charles R. Long, Jr., Buys Interests of Harry Vissering

Charles R. Long, Jr., president of the Charles R. Long, Jr., Company, manufacturers of railway and industrial paints, Louisville, Ky., vice-president of Harry Vissering & Company, manufacturers of railway supplies and equipment, and vice-president of the Okadee Company, manufacturers of locomotive specialties, Chicago, and also vice-president of the Viloco Machine Company, manufacturing machinists and engineers, Benton Harbor, Mich., has purchased the entire interest of Harry Vissering in the above companies and Mr. Vissering has retired from all of these companies.

Charles R. Long, Jr.

Mr. Long was born in Louisville, Ky., and after graduating from high school in 1888 entered business as secretary and treasurer of the Stratler Bros. Tobacco Company, Louisville, Ky., which position he held from 1890 to 1896. In the latter year he organized the Charles R. Long, Jr., Company to manufacture railway paints. In 1909 he also became one of the organizers of Harry Vissering & Company. In 1913 he was one of the founders of the Okadee Company and later became one of the incorporators of the Viloco Machine Company.

In the reorganization of the Viloco Machine Company, Mr. Long, vice-president, has been elected president, with headquarters at Louisville, Ky. In the reorganization of the Okadee Company, S. W. Russell, formerly secretary and treasurer of the Charles R. Long, Jr., Company, with headquarters at Louisville, Ky., has been appointed vice-president; J. S. Lemley, formerly mechanical expert, has been promoted to vice-president, with headquarters in the newly opened office in the Railway Exchange building, St. Louis, Mo., and W. H. Heckman, formerly mechanical engineer, has been promoted to vice-president. In the reorganization of Harry Vissering & Company, G. S. Turner, formerly vice-president, has been promoted to president. A. G. Hollingshead, president of the Okadee Company, and S. W. Russell have been appointed vice-presidents and W. H. Heckman, mechanical engineer, and J. S. Lemley, mechanical expert, have been promoted to vice-presidents. In the reorganization of the Charles R. Long, Jr., Company, A. G. Hollingshead, president of the Okadee Company, will be vice-president, and S. W. Russell, secretary and treasurer, has been promoted to vice-president.

Officers of the four companies under the reorganization are as follows:

VILOCO MACHINE COMPANY

Charles R. Long, Jr., president, Louisville, Ky.
G. S. Turner, vice-president, Chicago.
A. G. Hollingshead, vice-president, Chicago.
S. W. Russell, vice-president, Louisville, Ky.
F. G. Zimmerman, secretary and treasurer, Chicago.

THE OKADEE COMPANY

A. G. Hollingshead, president, Chicago.
Charles R. Long, Jr., vice-president, Louisville, Ky.
G. S. Turner, vice-president, Chicago.
S. W. Russell, vice-president, Louisville, Ky.
J. S. Lemley, vice-president, St. Louis, Mo.
W. H. Heckman, vice-president, Chicago.
J. M. Monroe, vice-president, Chicago.
F. G. Zimmerman, vice-president and secretary, Chicago.

HARRY VISSERING & CO.

G. S. Turner, president, Chicago.
Charles R. Long, Jr., vice-president, Louisville, Ky.
A. G. Hollingshead, vice-president, Chicago.
S. W. Russell, vice-president, Louisville, Ky.
F. G. Zimmerman, vice-president and secretary, Chicago.
W. H. Heckman, vice-president, Chicago.
J. S. Lemley, vice-president, St. Louis, Mo.
E. V. Trost, treasurer, Chicago.
J. M. Monroe, vice-president, Chicago.

CHARLES R. LONG, JR., COMPANY

Charles R. Long, Jr., president, Louisville, Ky.
A. G. Hollingshead, vice-president, Chicago.
S. W. Russell, vice-president, secretary and treasurer, Louisville, Ky.
G. S. Turner, vice-president, Chicago.
F. G. Zimmerman, assistant secretary, Chicago.
J. S. Lemley, vice-president, St. Louis, Mo.
J. M. Monroe, vice-president, Chicago.

The Central Electric Company

John R. Olsen has been promoted to vice-president and general sales manager of the Central Electric Company with headquarters at Chicago. Louis Sisskind has been promoted to vice-president and merchandise manager and Jacob M. Lorenz to vice-president and manager of railroad sales. Brief mention of these appointments was made in the *Railway Age* of February 28.

Mr. Olsen was born on November 2, 1884, in Copenhagen, Denmark. He entered the employ of the Central Electric Company in March, 1902, as a billing and claim clerk. In the following year he was transferred to the quotation department. In 1914 he was advanced to the position of city sales manager and, in 1919, to that of general sales manager, which position he was holding at the time of his recent promotion.

Mr. Sisskind was born on August 1, 1891, in Chicago and entered the employ of the Central Electric Company in 1910 as a stenographer in the railway sales department. In 1914 he was transferred to the engineering department and two years later to the Okonite department, of which he was appointed manager in 1918. During the war he served in the 342nd division of infantry as sergeant-major and subsequently as field clerk in service overseas. In June, 1919, he returned to the Central Electric Company as assistant to the vice-president in the executive department, and was later advanced to the position of merchandise manager, in which capacity he was serving at the time of his recent promotion.

Mr. Lorenz was born on January 14, 1865, at Ontario, Ohio, and was graduated from the Northwestern Ohio Normal school in 1883. Subsequent thereto he was a salesman for the Western Publishing House and the Central School Supply House until 1892, when he entered the service of the purchasing and supply department of the Chicago Telephone Company. He was later advanced to the position of chief clerk and assistant to the purchasing agent and storekeeper. In 1901 he became a salesman for the Central Electric Company, serving as city and railroad salesman and manager of the Okonite and Ralco departments, in which latter position he was serving at the time of his recent advancement.

J. R. Olsen

L. Sisskind

J. M. Lorenz

Fire at Berwick Plant of American Car & Foundry Company

A building used for the storage of pattern and flash lumber at the Berwick, Pa., plant of the American Car & Foundry Company was totally destroyed by fire on February 27 entailing a loss of from $400,000 to $500,000. The loss will not delay production.

Pressed Steel Car Company

The annual report of the Pressed Steel Car Company for the year ended December 31, 1924, shows net earnings for the year after interest, taxes and reserves for depreciation of $1,179,355 as compared with $1,706,862 in 1923.

Gross profits of $2,085,110 for the year after allowance for taxes, compared with earnings of $2,799,974 in 1923. The 1923 profits included dividends of $500,000 from the Western Steel Car & Foundry Company. From the 1924 gross profits there was $505,755 spent for maintenance of buildings and equipment, and $400,000 was set aside for depreciation, obsolescence, etc.

In his remarks to stockholders, President F. N. Hoffstot says in part:

"During the year the fourth dividend out of the earnings of 1923 of $1.75 per share was paid on the preferred capital stock, and one dividend of $1.75 per share out of the earnings of 1924 was paid on the preferred capital stock, but as there had been considerable discussion and some litigation as to whether dividends on preferred stocks should be paid currently, that having been the policy adopted by this company in the first quarter of its existence, counsel advised it was necessary to change its policy in this respect so as to conform strictly to the construction placed on its certificate of incorporation. This necessitates waiting until the end of the fiscal year—and then when the earnings for the year have been determined, declare from such earnings preferred dividends payable over the following year. It was a matter of regret to the directors to be compelled to adopt this course, but we are pleased to say that the full 7 per cent was earned in 1924, and there have been declared three dividends of $1.75 per share each, payable on June 9, September 3 and December 8, 1925, which when paid with the dividend paid June 10, 1924, will complete the full distribution. Two dividends of $1 per share each were paid on the common capital stock during the year, but at the time action on the preferred stock dividend was postponed, further dividends on the common stock were omitted.

"During the year $76,544 was expended on the Pennsylvania Malleable Company property for the purpose of increasing its efficiency and reducing costs. These expenditures were made in accordance with the terms of the lease of the Pennsylvania Malleable Company to your company which now owns 87.7 per cent of that company's stock.

"Operations during the past year have been efficient, but your management is relentlessly striving to further reduce the cost of production. Notwithstanding our efficiency, the percentage of profits this year is much less than it should be considering the capital invested and the risks involved. This low margin of profit is due to the increased number of car builders and close competition. Your company's business and that of its subsidiary companies is exclusively the manufacture of cars and car parts. In all our operations we have kept closely to the purposes for which the company was organized, and have relatively few investments in securities of companies engaged in other lines of business. Your company has no other business as some companies have, such as the operation of passenger and tank line cars, but are dependent entirely on sales in the open market of the products which we are fitted to manufacture.

"The year 1924 was a remarkable operating year for the railroads and was substantially without interference due to labor troubles. Weather conditions as a whole were good and maximum operating efficiency was secured. These efficient operations by the railroads naturally restricted the demand for new equipment (only 80,621 freight and 1,490 passenger cars having been built in 1924), but these conditions adjust themselves over a term of years as every car can make only so much mileage whether during a short

or a long period. The railroads have not had as many cars repaired in outside shops as heretofore, as they have caught up with this work and in addition new equipment only requires minor repairs. However, it is our opinion, that the railroads will find that it is cheaper for them to have their heavy repairs to freight cars made by the car companies at a profit, rather than to invest their money in plants and equipment to do such repairs, if they take into consideration all the elements of cost, such as interest on invested capital, depreciation and obsolescence and a proper proportion of all overhead and administrative expenses.

"Until the last half of June there was a let-down in business, but from the time that indications pointed to a continuance for the next four or five years of the present fiscal policy of the government—which is both constructive and economic—business has generally improved."

Statement of operations in 1924 compares with 1923 as follows:

	1924	1923
Earnings—		
From operations	$1,785,630	$2,191,061
From dividends on stock and securities owned and other sources	54,744	548,365
From interest and discount after deducting interest on the $6,000,000 bond issue	244,737	60,548
Gross earnings	$2,085,111	$2,799,974
Deduct—		
Maintenance of buildings and other equipment	$505,755	$430,640
Depreciation, obsolescence, etc	400,000	662,472
	$905.755	$1,093,112
Net earnings	$1,179,355	$1,706,863

American Brake Shoe & Foundry Company

The annual report of the American Brake Shoe & Foundry Company for the year ended December 31, 1924, shows net earnings after manufacturing, administrative and selling expenses; charges for depreciation and estimated federal taxes of $2,454,905. These net earnings are the combined earnings of the American Brake Shoe & Foundry Company, the American Malleables Company, the Dominion Brake Shoe Company, Ltd., the Southern Foundry & Machine Company and the Southern Wheel Company. The company pays 5 per cent dividends on its common stock. Surplus for the year after dividends totaled $985,994. In 1923 net earnings available for dividends totaled $2,727,097.

In his remarks to shareholders, Joseph B. Terbell, president, says:

"Considering the conditions which prevailed during the greater part of the year 1924, the net earnings derived from the operations of your company and its subsidiaries can be considered satisfactory. There was a decrease in the volume of sales of the parent company and of each of the subsidiaries. The net result, however, was helped by the addition of the earnings of the National Car Wheel Company, which was taken over by your company as of January 1, 1924.

"The accompanying consolidated income and surplus account shows that earnings from operations after deduction of all expenses, including reserve for depreciation and Federal taxes, were $2,454,904.85. Of this amount $1,468,910.75 was paid to stockholders in dividends, and the remainder, $985,994.10, was added to surplus.

"During the latter part of the year negotiations were started by the Ramapo Ajax Corporation for the acquisition of the plants of the Elliot Frog & Switch Company, located at St. Louis, Mo., and Pueblo, Colo. These negotiations were conducted in January of the present year. The plants are now being operated by the Ramapo Ajax Corporation.

"For some years your company has been interested in the development of what is known as a composite brake shoe. In order to obtain certain patent rights, which we believe would be useful in the development of this shoe, we purchased the patent rights, tools and machinery of the Pittsburgh Brake Shoe Company. Since the month of June we have been operating the Pittsburgh plant of that company, but have postponed efforts to increase the product of this plant until we have finished certain experimental work in connection with this type of shoe.

"In the interest of economy and to facilitate the handling of sales and operations, it was determined to consolidate the Southern Wheel Company and the National Car Wheel Company. On January 1st of the current year this consolidation was effected under the name of the Southern Wheel Company.

"The falling off in business of your company last year began in the month of May and continued until the month of October, when there was a distinct increase in sales. This latter condition has continued up to the present time, giving assurance of a good tonnage for the first quarter of the current year. While it is impossible to forecast with any certainty the volume of trade for the balance of the year, your management feels that the prospect is favorable for a continuance of the present conditions."

Obituary

Lester B. Churchhill, vice-president, treasurer and a director of the Magor Car Corporation, New York, and the National Steel Car Corporation, Hamilton, Ont., Canada, died after a brief illness at the Monmouth Memorial hospital, Long Branch, N. J., on February 27. Mr. Churchhill was born in Philadelphia, Pa., on August 21, 1870, and was graduated from the public and high schools of Montclair, N. J. His first position was with the Delaware, Lackawanna & Western in the freight claims department. In 1904, with J. R. Van Dyck, he organized the firm of Van Dyck, Churchhill Company, New York, with which company he continued as an officer and director until 1923. He became associated with the Magor Car Corporation in 1910 as treasurer and was later elected vice-president and a director. In 1920 he became also vice-president and a director of the National Steel Car Corporation.

Railway Construction

ALTON & EASTERN.—The Interstate Commerce Commission has granted a certificate permitting this company to acquire from James Duncan (who is its president) a railroad line extending from Grafton, Illinois, to East St. Louis, a distance of 37.9 miles. This line is a portion of the Chicago, Peoria & St. Louis which was authorized to abandon and sell its lines piecemeal, the section under consideration having been purchased by James Duncan for $1,350,000. The company proposes spending $500,000 for improvements on the line. This line is at present being operated by the receivers of the Chicago, Peoria & St. Louis and is the portion of that road which contributed a great part of its traffic. The Alton & Eastern is a subsidiary of the Illinois Company of St. Louis, Mo.

ATCHISON, TOPEKA & SANTA FE.—This company, jointly with the State Highway Commission of California, under an agreement just made, will construct an overhead highway crossing near Carlsbad, Cal., on the coast highway between San Diego, Cal., and Los Angeles, which will cost $33,000, the sum to be divided equally between the railway and the state.

CHICAGO, MILWAUEE & ST. PAUL.—The plan of the city of Chicago to lend this company $1,500,000 for the elevation of its tracks at Mayfair in Chicago, funds to be secured through a bond issue, was approved by the voters of Chicago at a recent election.

GREAT NORTHERN.—This company will soon call for bids for the construction of an 18-stall enginehouse at Troy, Mont., reported in the *Railway Age* of February 14.

GULF COAST LINES.—This company is reported to have plans for the construction of an additional freight station, a 64-ft. extension to the present freight station, and an 80-ft. extension of the loading platform at Harlingen, Texas.

NATIONAL RAILWAYS OF MEXICO.—An engineer appointed by President Calles of Mexico to determine the advisability of constructing a proposed line over the Sierra Madres in northern Mexico from Yavaros, Sonora, to Juarez, Chihuahua, states in his report that the construction of the line is possible but that the cost would be "enormous."

NEW YORK CENTRAL.—A contract has been awarded to the Jobson-Gifford Company, New York, for the reconstruction of the roof of the West Shore passenger terminal at Weehawken, N. J.; cost, approximately $30,000.

PENNSYLVANIA.—A contract has been awarded to J. McMenamin, Philadelphia, for the reconstruction of its viaduct over Streets Run at Hays Station, Pa. The work will cost approximately $300,000.

TERMINAL RAILROAD ASSOCIATION OF ST. LOUIS.—This company has applied for authority to extend the Seventh avenue viaduct, St. Louis, Mo., over its tracks a distance of 360 ft., and to construct under the viaduct an extension of the Atlantic street yard, the additional trackage to aggregate 21,000 ft. in length. The extension of the viaduct will be of reinforced concrete construction.

TEXAS, PANHANDLE & GULF.—Citizens of Ft. Worth, Texas, are reported to be planning to organize a trust company to take over the rights and holdings of C. H. Powell of Chicago who has been promoting the construction of this road. It proposes to construct a line from Tucumcari, New Mex., to Seymour, Texas, a distance of 304 miles, and a branch line from Ft. Worth, Tex., to Perrin, a distance of 55 miles. An effort is now being made to sell $4,000,000 of preferred stock in the company.

THE PENNSYLVANIA RAILROAD now uses 1000 motor cars for transporting trackmen from place to place and about 1500 hand cars formerly used have been withdrawn. The use of motor cars has enabled the company to recruit better men for track work. Thus far the Pennsylvania has reduced the number of sections by 215. Motor cars are used also by extra gangs, telegraph and signal maintainers, bridge inspectors and supervisors.

Railway Financial News

ATCHISON, TOPEKA & SANTA FE.—*Acquisition.*—This company has applied to the Interstate Commerce Commission for authority to acquire control by lease and by stock ownership of the Elkhart & Santa Fe, which has pending an application for a certificate authorizing it to build a line of 56 miles from a connection with the Santa Fe at Elkhart, Kan. The latter company also applied for authority to issue $50,000 of stock.

BALTIMORE & OHIO.—*Bonds.*—This company has been authorized by the Interstate Commerce Commission to issue $10,860,000 of refunding and general mortgage 6 per cent bonds to be pledged as collateral for short term notes or in substitution for collateral under the trust indenture securing its 10-year 6 per cent secured gold bonds, or its note for $9,000,000 to the director general of railroads.

BROOKLYN EASTERN DISTRICT TERMINAL.—*Held Subject to Section 15a.*—The Interstate Commerce Commission has held this company to be a "carrier" within the meaning of Section 15a of the Interstate Commerce Act and subject to the excess income provisions thereof. It is also held to be a "carrier" within the meaning of section 209 of the Transportation Act and entitled to the benefit of the guaranty of earnings for the six months following the end of federal control.

CENTRAL OF GEORGIA.—*Equipment Trust.*—The Interstate Commerce Commission has authorized an issue of $1,410,000 of equipment trust certificates to be sold at 96.14.

CHESAPEAKE & OHIO.—*Bonds.*—This company has applied to the Interstate Commerce Commission for authority to nominally issue $492,000 of first lien and improvement 20-year 5 per cent mortgage bonds.

CHESAPEAKE & OHIO.—*New Protective Committee.*—A new stockholders protective committee has been formed by southern business interests, with headquarters at Richmond, Va. The new committee is distinct from the committee headed by Hobart S. Bird with headquarters in New York.

A statement issued by George Cole Scott, chairman of the committee and director of the Merchants National Bank of Richmond, Va., signed by other members of the committee urges C. & O. stockholders to deposit their stock with the committee. The statement says that the committee represents a large block of stock and that the terms of exchange as offered by the Nickel Plate interests are disproportionate and unfair.

Other members of the committee include George S. Kemp, of Bryan, Kemp & Co., of Richmond, Va.; Lindsay Hopkins, director of the Federal Reserve Bank of Atlanta; John Stewart Bryan, owner of the News-Leader of Richmond, and Berkley Williams, member of John L. Williams & Co., of Richmond.

The committee has urged holders of C. & O. convertible 5 per cent bonds maturing in 1946 to exchange their securities for common stock so that they may be represented at the meeting called to ratify the Nickel Plate lease to be held March 30.

CHINESE GOVERNMENT.—*Arrears of Interest to Be Paid.*—Announcement was made by J. P. Morgan & Co., on February 28, that the Chinese Government would begin on March 2, to clear up the 25 per cent arrears on the German portion of the Hukuang Railway, 5 per cent gold loan of 1911. This loan was placed in 1911 in amounts of £1,500,000 each in New York, London, Paris and Berlin. The Chinese government withheld interest on approximately two-thirds of the German portion of the loan beginning with that due December, 1919. Current interest was resumed with the December, 1924, coupon, leaving about 25 per cent in arrears. The announcement said:

"J. P. Morgan & Co. announce that, as a result of provision made therefor by the Chinese government and pursuant to the plan for dealing with such coupons as stated by the Chinese government under date of July 3, 1924, they will be prepared on Monday, March 2, 1925, to pay coupon No. 17, which matured December 15, 1919, from bonds of the German issue of this loan."

CUMBERLAND & PENNSYLVANIA.—*Valuation.*—The Interstate Commerce Commission has served a tentative valuation report in which the final value of the property owned as of 1918 is placed at $4,109,950 and that of the property used is placed at $4,110,200.

MISSOURI PACIFIC.—*Equipment Trust.*—Interstate Commerce Commission approval has been given for the $8,820,000 issue of equipment trust certificates Series D, recently sold to Kuhn, Loeb & Co.

NEW YORK CENTRAL.—1924 *Earnings.*—Net corporate income of the New York Central for the year ended December 31, 1924, was $39,250,399, after taxes and charges, equal to $12.87 a share earned on $304,836,835 capital stock. This compares with $45,339,427, or $16.90 a share, on $268,237,375 outstanding stock in 1923.

NEW YORK, NEW HAVEN & HARTFORD.—*Bonds.*—The Interstate Commerce Commission has authorized the issue of $23,000,000 of 15-year secured 6 per cent bonds to pay outstanding bonds of the European loan of 1917; also the issue of $23,000,000 first and refunding mortgage 6 per cent bonds to be pledged as security.

WABASH.—*Bonds.*—The Interstate Commerce Commission has authorized an issue of $12,500,000 of refunding and general mortgage 5½ per cent bonds to be sold at 93.

WESTERN PACIFIC.—*Bonds.*—This company has applied to the Interstate Commerce Commission for authority to issue $4,000,000 of first mortgage 5 per cent bonds. The Western Pacific Railroad Corporation has agreed to bid 90 and interest for the bonds but because some of its directors are directors of the railroad it is proposed to offer the bonds for sale in a single block on competitive bids and to sell them pursuant to the best bid not less than 90 and to comply in all respects with the Clayton law.

Dividends Declared

Buffalo & Susquehanna.—Common, 1¾ per cent, quarterly, payable March 31 to holders of record March 14.

Erie & Pittsburgh.—$.87, quarterly, payable March 10 to holders of record February 28.

Lackawanna Railroad of New Jersey.—1 per cent, quarterly, payable April 1 to holders of record March 7.

Newark & Bloomfield.—3 per cent, payable April 1 to holders of record March 24.

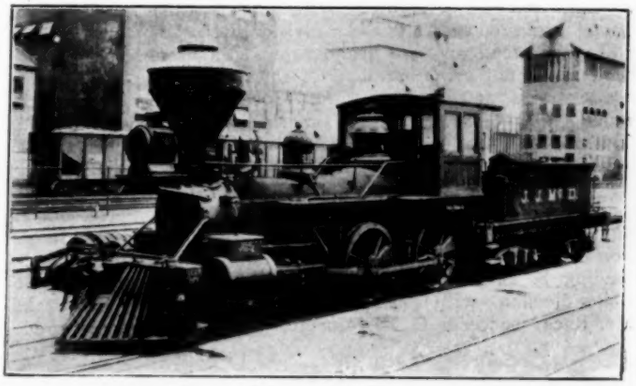
New York, Lackawanna & Western.—1¼ per cent, quarterly, payable April 1 to holders of record March 14.

Pittsburgh, Ft. Wayne & Chicago.—Common, 1¾ per cent; preferred, 1¾ per cent; both payable April 1 to holders of record March 10.

Warren Railroad.—3½ per cent, payable April 1 to holders of record April 4.

Trend of Railway Stock and Bond Prices

	March 3	Last Week	Last Year
Average price of 20 representative railway stocks	84.23	82.84	62.06
Average price of 20 representative railway bonds	90.86	90.81	83.76



Courtesy Dearborn Independent

Old Rogers Locomotive Purchased by Henry Ford for His Transportation Museum

Railway Officers

Executive

W. Brewer has been elected secretary of the Alabama & Vicksburg and the Vicksburg, Shreveport & Pacific, with headquarters at New Orleans, La., succeeding Udolpho Wolfe, resigned. **William J. Baader** has been elected assistant secretary and **J. E. Cambias** has been elected treasurer, both with the same headquarters.

Financial, Legal and Accounting

J. M. Cheney, assistant interstate commerce counsel of the Missouri Pacific, with headquarters at St. Louis, Mo., has been promoted to valuation attorney, with the same headquarters, a newly created position. **G. W. Holmes** has been appointed assistant interstate commerce counsel, with headquarters at St. Louis, succeeding Mr. Cheney.

Operating

R. H. Dwyer, superintendent of the Louisiana division of the Missouri Pacific, with headquarters at Monroe, La., has been transferred to the Central division, with headquarters at Van Buren, Ark., succeeding **W. E. Lamb,** who in turn succeeds Mr. Dwyer as superintendent of the Louisiana division.

T. F. Lowry, superintendent of the St. Paul division of the Northern Pacific, with headquarters at Minneapolis, Minn., has been promoted to acting general superintendent of the Central district, with headquarters at Livingston, Mont., succeeding **T. H. Lantry,** who has been granted leave of absence on account of illness. **O. F. Ohlson,** assistant superintendent of the Montana division, with headquarters at Billings, Mont., has been promoted to acting superintendent of the St. Paul division, with headquarters at Minneapolis, Minn., succeeding Mr. Lowry. **D. E. Nichols,** trainmaster on the Pasco division, has been promoted to acting assistant to the general superintendent, with headquarters at Livingston, Mont., succeeding **R. T. Taylor,** who has been assigned temporarily to other duties.

A. C. Shields, engineer maintenance of way of the Denver & Rio Grande Western, with headquarters at Denver, Colo., has been promoted to assistant general manager, with the same headquarters, with supervision over maintenance of way and structures, a newly created position. The position of engineer maintenance of way has been abolished. In the reorganization of the operating department, **J. T. Nedwideck,** general superintendent, with headquarters at Pueblo, Colo., has been given jurisdiction over the First district, which includes the Pueblo, Salida and Alamosa divisions. **J. D. Stack,** general superintendent, with headquarters at Salt Lake City, Utah, has been given jurisdiction over the Second district, which includes the Grand Junction and Salt Lake divisions. **L. W. Bowen,** general superintendent, with headquarters at Durango, Colo., has been appointed superintendent of the Alamosa division, with headquarters at Alamosa, Colo., succeeding **E. W. Deuel,** transferred. **C. B. Carpenter,** superintendent of the Gunnison division, with headquarters at Gunnison, Colo., has been transferred to the Salida division, with headquarters at Salida, Colo., succeeding **Hugh Wilson,** transferred. The division point at Gunnison has been abolished. **Hugh Wilson,** superintendent of the Salida division, has been transferred to the Grand Junction division, with headquarters at Grand Junction, Colo., succeeding **S. L. Racey,** who has been transferred to the Salt Lake division, with headquarters at Salt Lake City, Utah. Mr. Racey succeeds **G. E. Johnson,** who has been transferred.

Traffic

H. E. Poulterer has been appointed general agent in the freight department of the Union Pacific, with headquarters at Kansas City, Mo., succeeding W. T. Price, promoted.

Charles S. Stout, for the past four years secretary to the vice-president in charge of traffic and commercial development of the Baltimore & Ohio, has been appointed district freight representative at Newark, N. J.

J. H. Collins has been appointed general agent, freight traffic department, of the Central of New Jersey, with headquarters at Albany, N. Y. **W. E. Howes** has been appointed to a similar position at Buffalo, N. Y.

E. M. Presley, division passenger agent of the Pennsylvania, with headquarters at Pittsburgh, Pa., has been transferred to Columbus, Ohio, in the same capacity, to succeed **L. B. Freeman,** who has retired, effective March 1. **R. M. Flocker,** chief clerk in the passenger department of the Central region at Pittsburgh, has been promoted to division passenger agent in that city, to succeed Mr. Presley.

Mechanical

H. C. Stevens has been appointed master mechanic of the Alamosa division of the Denver & Rio Grande Western, with headquarters at Alamosa, Colo.

J. G. Crawford, fuel engineer of the Chicago, Burlington & Quincy, with headquarters at Chicago, has been appointed general manager of the Valier Coal Company, Valier, Ill.

C. A. Garber, master mechanic on the Illinois Central, with headquarters at Memphis, Tenn., has been appointed mechanical superintendent of the Missouri Pacific, with headquarters at St. Louis, Mo., succeeding **W. C. Smith,** who has been promoted to assistant to the chief mechanical officer, a newly created position.

L. E. Cartmill, superintendent of shops of the Pacific Fruit Express, with headquarters at Los Angeles, Cal., has been promoted to assistant general superintendent of the car department, with headquarters at San Francisco, Cal. **James King,** superintendent of shops at Colton, Cal., has been transferred to Los Angeles, succeeding Mr. Cartmill. **R. J. Howard** has been appointed superintendent of shops at Colton, succeeding Mr. King.

Engineering Maintenance of Way and Signaling

C. D. Johnson has been appointed division engineer of the Alamosa division of the Denver & Rio Grande Western, with headquarters at Alamosa, Colo.

G. W. Gallier has been appointed district engineer maintenance of way of the Illinois district of the Chicago, Burlington & Quincy, with headquarters at Galesburg, Ill., succeeding H. C. Murphy, transferred.

Obituary

R. H. Widdicombe, formerly commerce attorney of the Chicago & North Western, with headquarters at Chicago, who retired from active service last year, died recently at San Diego, Cal.

C. E. Dodge, consulting engineer of the Southern Pacific when that railway curbed the Colorado river flood in 1906 which threatened to engulf the Imperial valley of California, died recently in Los Angeles, Cal., of heart trouble.

Chester W. Bliss, formerly and for several years assistant superintendent of the Boston & Albany, and a director of that company since its control by the New York Central, died at his home in New London, Conn., on March 2, at the age of 66. He was the son of William Bliss, who for many years was president of the Boston & Albany.

THE NUMBER OF CARS in a freight train would be limited to 48 and in passenger trains to 12, according to a bill which has been introduced in the legislature of California. The bill is being opposed by farmers and fruit growers as well as the railways on the grounds that it would interfere with the movement of fruit and vegetables to the east.